NAPLAN Numeracy Year 5: Number and Algebra

This document contains Year 5 Number and Algebra resources including items for:

- Number and place value
- Fractions and decimals
- Money and financial maths
- Patterns and algebra.

These items aim to develop and test Year 5 students' proficiency with the content of these sub-strands.

Please note that these resources do not encompass all that should be taught and learned for Number in Year 5. Not all of the content of the curriculum can be effectively assessed in a written test format.

Revised October 2016

Partitioning whole numbers

Background information/teaching focus

Students need to be able to think flexibly of numbers as being composed of other numbers. Partitioning large collections in standard ways makes counting easier. Place value makes it easier to split a number into parts. There are standard place value partitions, such as 582 = 500 + 80 + 2.

When students understand the meaning of numbers and see the part-whole relationships among them, they can flexibly and fluently partition numbers in non-standard ways. For example, thinking of 582 as 382 + 200 helps to subtract 198. Understanding part-whole relationships enables students to visualise numbers in different ways and to develop efficient strategies for mental calculation.

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal number
  - Key understanding 6: Place value helps us to think of the same whole number in different ways and this can be useful p. 60.

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Western Australian Curriculum

- Year 3 – Apply place value to partition, rearrange and regroup numbers to at least
- 10 000 to assist calculations and solve problems (ACMNA053).
- Year 4 – Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems (ACMNA073).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- When students physically bundle or group materials into tens, hundreds etc. they learn to trust that one 'ten' is the same quantity as ten individual ones; that ten bundles of ten is the same as 100 single items and so on. Provide opportunities for students to count and group or bundle large collections of objects. Have students bundle a large number of straws and organise the bundles in standard and non-standard partitions of the whole collection. Group collections of ten objects, eg gumnuts in bags of ten, then group ten bags of ten into a larger plastic bag, and so on. Record the total and draw attention to the position and meaning of each digit.
- Materials such as place value charts, multi-attribute blocks and place value flip cards support consolidation of students' understanding of partitioning based on place value.
- Represent large numbers with bundled materials and on grid paper. Focus students on the connection between the meaning of the digits and the quantity in the collection or the representation on the grid paper. Re-bundle in non-standard ways and repeat the process.
- Count and combine large collections using bundling or by representing the numbers involved on grid paper. Use numbers and symbols to record the operation and the calculations.

- Play ‘100 dice roll’ where students use place value understanding to make the largest or smallest number possible and keep a successive total until the target number is reached eg 100. Modify the target number or limit the number of rolls.
- Place value trading (eg 316 = 316 ‘ones’ or 3 ‘hundreds’ 1 ‘ten’ 6 ‘ones’ or 31 ‘tens’ 6 ‘ones’) and rename numbers (1265 = 1000+200+60+5; 1000+100+150+15).

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Grid partitioning p. 31
- Breaking up p. 65
- Grouping objects p. 66
- Flexible numbers p. 66
- Different strategies p. 67

The following activities are from *First Steps in Mathematics: Number* (book two):

- Wipe out p. 137
- Compensation p. 137

Numeracy online resources

- Year 4–5 Number: Understand whole and decimal numbers
  Learning sequence 1
  Learning sequence 3

Question 1

Which one of these is equal to 397?

- ◯ Three hundreds and ninety seven tens
- ◯ Three hundreds and seventy nine ones
- ◯ Three hundreds, nine tens and seven ones
- ◯ Three hundreds, nine ones and seven tens

Skill: Students recognise standard partitions of a three-digit number.
Answer key: C

Additional questions

1. Could three hundreds and 97 tens make 397? Explain.
2. What does 9 tens mean?
3. If you counted 9 tens by ones, what number would you reach?
4. Write three other ways of partitioning 397.
5. Ben wants to add 50 to 397. What would be a useful way to partition 397 so he could do this easily?

Question 2

Expand this number.

56 475 = _____ + _____ + _____ + _____ + _____

Skill: Students partition five-digit numbers in their own way.
Answer key: Any five correct partitions of the number.
Note: When students choose a non-standard way of partitioning, it is more likely that they understand the meaning of the numbers they write.

Additional questions

1. What does the '+' sign mean?
2. How did you decide which five numbers to write?
3. Write a different way to split the number 56 475 into five parts.
4. My father had $56 475 dollars in the bank. He drew out $6000.
   How much money did he have left? Why can't it be $5475?
5. Highlight the importance of the zero as a placeholder.

Question 3

Which one of these is equal to 104?

- ◯ 104 tens
- ◯ 100 tens and 4 ones
- ◯ 10 hundreds and 4 ones
- ◯ 10 tens and 4 ones

Skill: Students non-standard partitions of a three-digit number.
Answer key: D

Additional questions

1. How did you decide which one was correct? What did you need to know?
2. How many tens are there in: 204, 304, 404?
3. What pattern can you see?
4. How could you find out the number of tens in any three-digit number?
5. How many tens are there in 1104?
6. How could you work out how many hundreds there are in a five-digit number?

Question 4

A family spent $130 on new smart phones.

Which three smartphones did they buy?

Superstar

$35

Planet O

$70

Network T

$45

M phone

$25

Skill: Students select non-standard partitions for a three-digit number.
Answer key: A, B & D
Note: Remind students to read the instructions carefully each time.

Additional questions

1. How did you work out which three phones the family bought? What did you have to think about?
2. Would thinking about $130 as $100 and $30 to begin with make it easier? Why?
3. List three other ways to split $130 into three different amounts. Write your own question for a friend. Use a different total and four different prices to choose from. Was your question more difficult than this one? Why?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal numbers
  - Key understanding 2: We can often see how many are in a collection by looking and also by thinking of it in parts. p. 24
  - Key understanding 6: Place value helps us to think of the same whole number in different ways and this can be useful. p. 60

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 1: Adding and subtracting numbers is useful when we: change a quantity by adding more or taking some away think of a quantity as combined of parts equalise or compare two quantities. p.12
- Chapter 4: Calculate
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head. p. 132

Student worksheet

Focus

Partitioning whole numbers

Question 1	Question 2
Which one of these is equal to 397? ○ Three hundreds and ninety seven tens ○ Three hundreds and seventy nine ones ○ Three hundreds, nine tens and seven ones ○ Three hundreds, nine ones and seven tens	Expand this number. 56 475 = _____ + _____ + _____ + _____ + _____
Question 3	**Question 4**
Which one of these is equal to 104? ○ 104 tens ○ 100 tens and 4 ones ○ 10 hundreds and 4 ones ○ 10 tens and 4 ones	A family spent $130 on new smart phones. Which three smartphones did they buy?  Superstar $35 ○  Planet O $70 ○  Network T $45 ○  M phone $25 ○

Number sentences based on addition or subtraction

Background information/teaching focus

A good understanding of equality is essential for algebraic thinking. Many students interpret the = sign as 'makes' or as a signal to 'find the answer'. When asked to complete __ + 7 = 12, they may write 5 on the line but nevertheless say that 12 is the answer. Some will find a number sentence like __ + 5 = 12 + 3 nonsense and others will write 7 on the line and ignore the + 3. It is important to emphasise that the = sign means 'is equal to' and that it indicates that both sides of the equation represent the same amount or equality.

Using properties of operations and relationships between them means that students can construct and rearrange number sentences into simplified forms that help them solve equations and simplify computations.
Students should use their understanding of properties and relationships to:

- **complete** mathematical statements (without finding the 'answer' to the calculations), for example: 43 + 21 = ___ + 16 (put in the missing number) or 14 ÷ 0.7 ☐ 14 (put in < or = or >). Students should also generate numbers or pairs of numbers that fulfil some kind of constraint, such as, ☐ + ◇ = 15. Students should consider whether they have all the possible numbers or pairs, how many there might be and how they can be sure they have them all.
- **construct** mathematical statements, for example: 20 – 6 = 7 + 7
- **check** the truth of mathematical statements.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers in to part-part-whole helps us relate addition and subtraction and understand their properties. p.20
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true. p.66

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- Year 4 – Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction (ACMNA083).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

For ideas for activities see *First Steps in Mathematics: Number* (book two):

- Unknown number p. 25
- Bigger or smaller p. 70
- Choosing operations p. 26
- Bigger, smaller or equal (1) and (2) p. 70

Numeracy online resources

- Year 4–5 Number: Understand operations
  Learning sequence 3

Question 1

Without using 0, write one digit in each shape to make the number sentence correct.

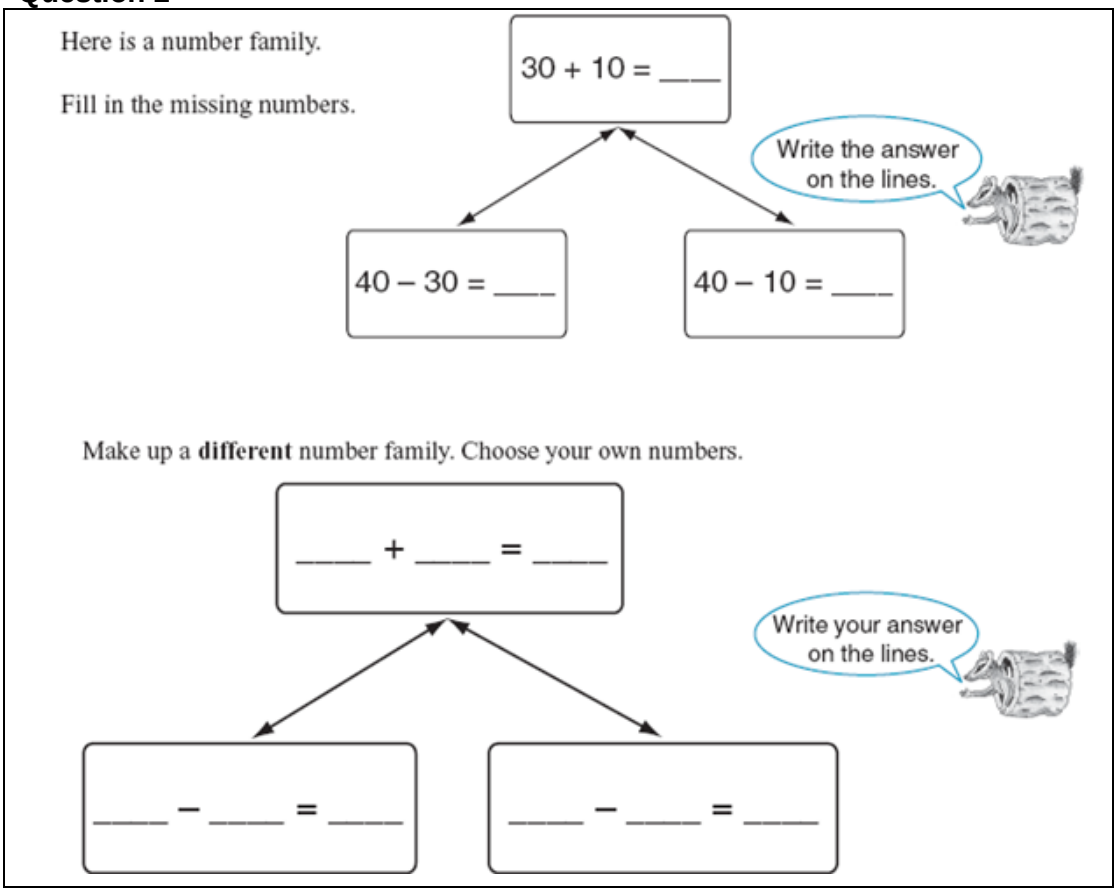
□ + △ = 3

Skill: Students choose addends in an addition number sentence.
Answer key: 1 and 2 or 2 and 1

Additional questions

1. What tells you that the answer cannot be 1.5 + 1.5?
2. If the answer was 10, what are all the possible whole numbers that could go in the square and the triangle? How many different pairs can you find?
3. What if the total is 10, but you could use halves and quarters? What are some of the numbers you could put in the shapes? How many different pairs can you find?

Question 2

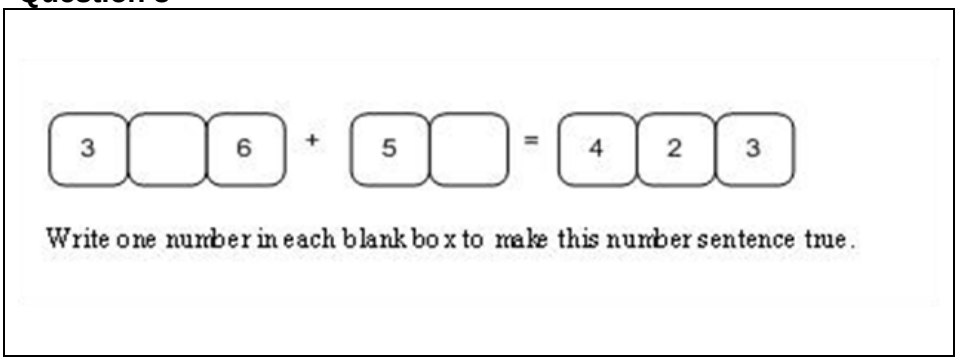


Skill: Students solve and write number sentences showing inverse relationships.
Answer key: Any other correct *number family,* for example 20 + 10 = **30**; 30 - 20 = **10**; 30 – 10 = **20**.

Additional questions

1. How does the 30 + 10 help you know the answer to the two subtraction number sentences?
2. What do you need to think about to plan your own *number family*?
3. Jane wrote an addition number sentence. How does she decide what is the starting number for the two subtraction number sentences?
4. Using whole numbers only, write two addition number sentences that add to 20. How many different sentences can you find? How many different sentences can you find if you use halves and quarters?

Question 3

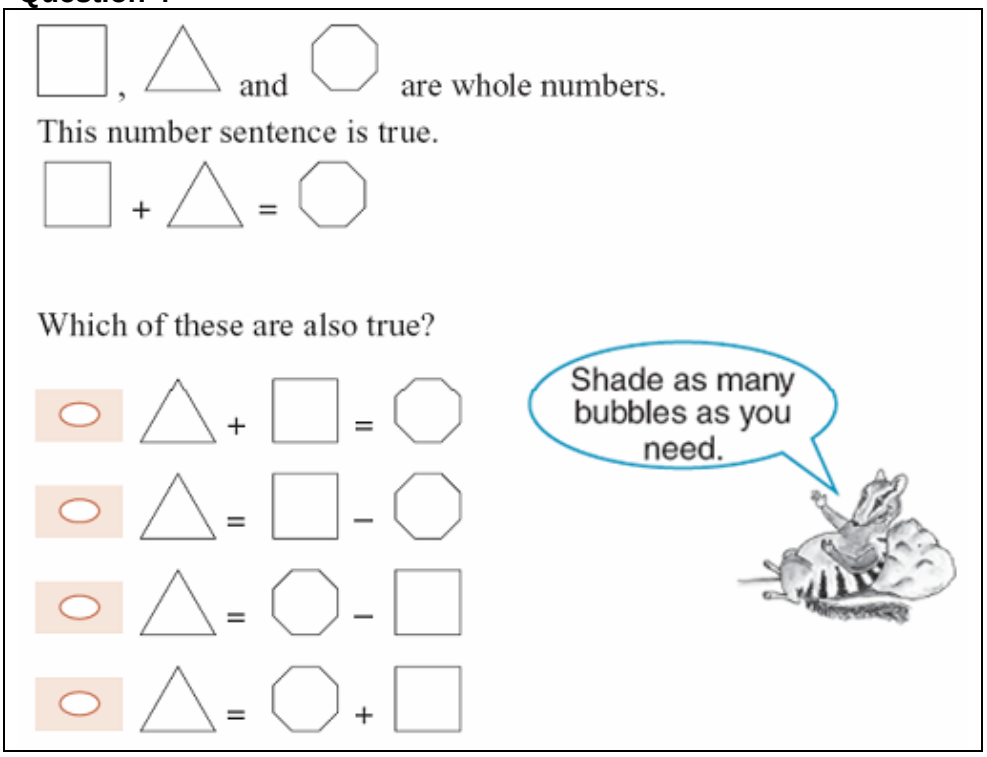


Skill: Students solve missing-digit addition problems.
Answer key: 366 + 57 = 423

Additional questions

1. What strategy did you use to find the missing ones digit in the second number?
2. What effect does this have on the missing tens digit in the first number?
3. Write some missing-digit problems and ask someone else to solve them.
4. Write a missing-digit problem based on subtraction.

Question 4



Skill: Students recognise inverse relationships between addition and subtraction.
Answer key: A and C
Note: Remind students that sometimes more than one bubble needs to be shaded.

Additional questions

1. Write whole numbers in the top number sentence to make it true? How many groups of numbers could you write?
2. How can you find the number in the triangle if you know the other two numbers?
3. Question 1 above states that the shapes represent **whole** numbers. If decimals were used, would your answer change? Explain your thinking.
4. Regina correctly said that she can write other number sentences using the three shapes. Can you write the number sentences she was thinking of?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties. p.12
- Chapter 4: Calculate
  - Key understanding 2: We can think of a number as a sum or difference in different ways. We can rearrange the parts of an addition without changing the quantity. p.106

Student worksheet

Focus

Number sentences based on addition or subtraction

Question 1

Without using 0, write one digit in each shape to make the number sentence correct.

□ + △ = 3

Write one digit in each shape.

Question 3

3		6	+	5		=	4	2	3

Write one number in each blank box to make this number sentence true.

Question 2

Here is a number family.

Fill in the missing numbers.

30 + 10 = ____

40 – 30 = ____

40 – 10 = ____

Write the answer on the lines.

Make up a **different** number family. Choose your own numbers.

____ + ____ = ____

____ – ____ = ____

____ – ____ = ____

Write your answer on the lines.

Question 4

□, △ and ⬡ are whole numbers.

This number sentence is true.

□ + △ = ⬡

Which of these are also true?

- ○ △ + □ = ⬡
- ○ △ = □ – ⬡
- ○ △ = ⬡ – □
- ○ △ = ⬡ + □

Shade as many bubbles as you need.

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Number patterns based on one of the four operations

Background information/teaching focus

Students should learn that representing aspects of a situation with numbers and then looking for patterns in the numbers can help us understand the situation better. Students initially develop their understanding of patterns through frequent opportunities to copy, continue and create simple patterns, eg shell, button, button, bead, bead, bead… These patterns made with objects can then be represented with numbers, ie. 1, 2, 3…

Investigating and describing patterns helps students generalise about a situation and apply the generalisation to new situations.

Students who suggest a rule for a pattern also need to learn to test their rule against all of the information. For example, given a sequence beginning 1, 2, 4, 7, _ , … they might see a doubling pattern for the first three terms and not check that the rule they have applied continues to produce the pattern. A pattern rule is right when it fits all the information we have and describes the pattern precisely.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 5: Reason about number patterns
  - Key understanding 2 – Representing aspects of a situation with numbers can make it easier to see patterns in the situation.
  - Background notes p. 258

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- Year 3 – Describe, continue, and create number patterns resulting from performing addition or subtraction (ACMNA060).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

Investigate patterns in Pascal's triangle and Fibonacci numbers or given parts of a 100 square.

For further ideas for activities see *First Steps in Mathematics: Number* (book two):

- Puppies p. 217
- What's next p. 217
- What's my rule? p. 226
- Function box p. 228
- Sticky instructions p. 239
- Triangular numbers p. 217
- How many p. 215
- Recording p. 226
- What's next p. 226
- Pattern patterns p. 239

Question 1

Each new number in this pattern is made by adding together the two numbers before it.

? , 16, 23, 39

What is the first number in the pattern?

Skill: Represent aspects of a situation with numbers to make identifying patterns from a precise rule and using strategies to identify common types of patterns.
Answer key: 7

Additional questions

1. What would the first number be if the pattern was:
   ? , 160, 230, 390?
2. Continue the sequence forward for another 3 terms.
3. What would be the tenth number in the pattern (above)?

Question 2

67, 65, 63, 61, ?

Which number comes next in this pattern?

- 59
- 60
- 61
- 62

Skill: Students recognise a pattern based on a repeated subtraction.
Answer key: A

Additional questions

1. Continue the pattern for three more numbers. What rule are you using?
2. John started this pattern: **67, 69, 71, 73, …**
   What was his rule? How do you know?
3. Make up some patterns using an addition or a subtraction rule. Ask a friend to continue your pattern. Check your friend's answer.

Question 3

Erin has shaded boxes in a counting pattern starting at 4.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

What is the **next** number Erin should shade in this pattern?

34 36 38 40

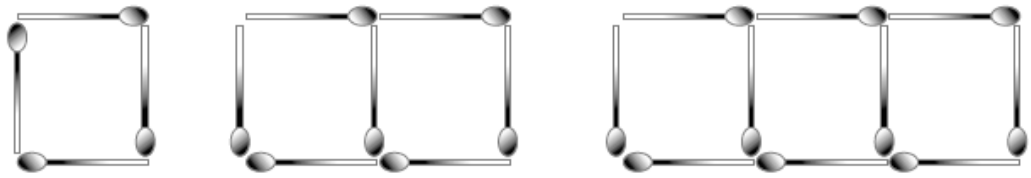
Skill: Students recognise a pattern shown on a number grid.
Answer key: 34

Additional questions

1. If you use the same rule and start at 2, what number would you shade next?
2. If the first shaded number was 6 and the rule was the same, write the next three numbers of the pattern.
3. If the rule was add 10 to the previous number and the starting number was seven, what is the second number in this pattern?
4. Peter is using a grid with eight numbers in each row (1–8 in the squares on the first row and so on). He starts at 4 and adds six each time: What will the first four numbers in his pattern be?
5. What other number will be in the same row with the sixth number in the pattern?

Question 4

Tony made a pattern using matchsticks.



Shape 1 Shape 2 Shape 3

Write your answer on the line.

How many matchsticks will he need to make Shape 5? _____

Skill: Given part of a pattern sequence, students visualise future terms.
Answer key: 16

Additional questions

1. How many extra matches are needed to add another square onto the end?
2. A square has four sides, but you only need three matches to add another square in the pattern. Why?
3. How did you work out how many matches would be needed for Shape 5?
4. If you were making a string of triangles with matches, how many more matches would you need to make each new triangle? Why?

Question 5

What is the next number in this pattern?

8 000, 4 000, 2 000, 1 000, ?

- 0 000
- 5 000
- 500
- 100
- 50

Skill: Students recognise a halving pattern in thousands.
Answer key: 500

Additional questions

1. What number would you have if you repeated the pattern three **more** times?
2. If you kept repeating the pattern to the right, could you end up with a zero? Why/why not?
3. Write the first four numbers of your own *halving* pattern, starting from a different number. Ask a partner to write the next three numbers in your pattern.
4. To find the numbers before 8 000 in the pattern above, what should you do?
5. Guess the tenth term before the 8 000 in the pattern above. Use your calculator to check your guess.

Curriculum references

Department of Education and Training Western Australia, 2004, *First Steps in Mathematics: Number* (book 2):

- Chapter 5: Reason about number patterns
  - Key understanding 1: We use regularity or pattern to infer one thing from another and to make predictions. p.200
  - Key understanding 2: Representing aspects of a situation with numbers can make it easier to see patterns in the situation. p.212
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern. p.224

Student worksheet

Focus

Number patterns based on one of the four operations

Question 1

Each new number in this pattern is made by adding together the two numbers before it.

? , 16, 23, 39

What is the first number in the pattern?

Question 2

67, 65, 63, 61, ?

Which number comes next in this pattern?

- 59
- 60
- 61
- 62

Question 3

Erin has shaded boxes in a counting pattern starting at 4.

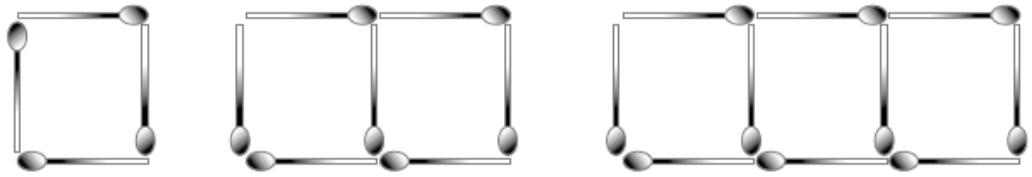
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

What is the **next** number Erin should shade in this pattern?

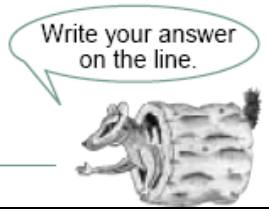
34 36 38 40

Question 4

Tony made a pattern using matchsticks.



Shape 1 Shape 2 Shape 3



How many matchsticks will he need to make Shape 5? _____

Question 5

What is the next number in this pattern?

8 000, 4 000, 2 000, 1 000, ?

- 0 000
- 5 000
- 500
- 100
- 50

Relating a number sentence to a story

Background information/teaching focus

Computation involves the processes of addition, subtraction, multiplication and division. These operations are connected in many ways, including by inverse relationships. Students need to develop competency in calculation in conjunction with an understanding of these operations. Knowledge of the range of situations which can be represented using a particular operation assists students to choose an appropriate operation to solve number stories and problems.

To solve everyday problems involving numbers we have to represent the problem as a number sentence. For example, when we buy two things that cost $35 and $17 we think of the situation as '35 add 17 is what?' Students need frequent practice in representing problems in ways that enable them to be dealt with mathematically. However, for common situations, the process will eventually become almost subconscious.

For further related information *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 8: Thinking of a problem as a number sentence often helps us solve it. Sometimes we need to rewrite the number sentence in a different but equivalent way.

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- Year 4 – Solve word problems by using number sentences involving multiplication or division where there is no remainder (ACMNA082).
- Year 4 – Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction (ACMNA083).
- Year 5 – Find unknown quantities in number sentences involving multiplication and division and identify equivalent number sentences involving multiplication and division (ACMNA121).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Think board 1: Use a think board with sections for number sentences, number stories, diagrams and objects. In groups of three, students complete a think board where one section is given. Discuss the meaning of the problem and share solutions.
- Think board 2: Provide students with think boards which do not correctly represent or solve the number stories displayed. Ask them to work in groups to identify the incorrect sections of the think boards. Share their findings and suggestions for 'fixing' the think boards.

- Operation groups: Students form small groups. Provide groups with a range of problems in story and number sentence form. Have students cut and group the problems according to the operation they would use to solve the problem. Identify problems that can represented with different number sentences, eg 21-7=? and 7+?=21 can both be solved with subtraction. Discuss why they represent the same problem and can both be solve with subtraction. Make and label displays of these problems.

For further ideas for activities see *First Steps in Mathematics: Number* (book one):

- Number relationships p. 24
- Think board p. 24
- Which operation? p. 25
- Choosing operations p. 26
- Inverse relationships p. 26
- Equal groups p. 32
- Choosing operations p. 35
- Multiplication and division p. 46

Numeracy online resources

- Year 4-5 Number: Understand Operations
  Learning sequence 3
  Learning sequence 6
  Learning sequence 8

Question 1

Marie had 12 biscuits. She then ate 2 and gave 3 to a friend.

How many biscuits does Marie have left?

7	8	9	17
⬭	⬭	⬭	⬭

Skill: Students select the story that matches an expression involving a multi-step subtraction problem.
Answer key: 7

Additional questions

1. How did you decide what operation was needed? Which words gave you a clue?
2. Write a number sentence to represent your thinking.
3. Write your own two-step number story. Ask a friend to solve your problem and write a number sentence about it.

Question 2

In Year 4 there are 13 more girls than boys.
Trent knows there are 49 girls.

How can Trent work out the number of boys in Year 4?

- add 49 to 13
- subtract 13 from 49
- multiply 13 by 49
- divide 49 by 13

Skill: Students select the story that matches an expression.
Answer key: Subtract 13 from 49

Additional questions

1. Write another number sentence that matches the word problem.
2. Create some other word problems with unknown numbers. Decide what numbers are unknown and use algebraic symbols to represent them.
3. Write expressions using algebraic symbols to represent the problem.
4. Explain what the symbols mean.

Question 3

Which of the following stories does **148 – 37** match?

- There are 148 goats in one paddock and 37 goats in another paddock. What is the total number of goats?
- There are 148 goats in each of 37 paddocks. How many goats are there altogether?
- There are 148 goats that need to be put into 37 paddocks. How many goats will be in each paddock?
- There are 148 goats in one paddock and 37 of them are put onto a truck. How many goats are left in the paddock?

Skill: Students select the story that matches an expression involving subtraction.
Answer key: D

Additional questions

1. What did you think about to decide which story matched 148 – 37?
2. Write another number story that matches 148 – 37.
3. Write a number story to match 148 – ? = 37.

Question 4

Mary bought 7 apples and Zac bought some more.
They have 13 apples altogether.

How many apples did Zac buy?

_____

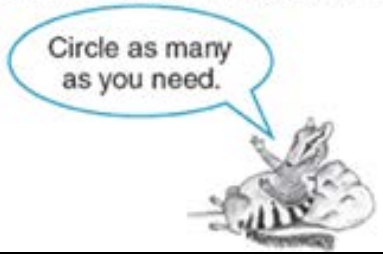
Circle **all** the number sentences that match the story problem.

13 – 7 =?

7 + 13 =?

7 – 13 =?

7 + ? =13



Skill: Students select the number sentence that matches a story involving addition.
Answer key: 7 + ? = 13 or 13 – 7 = ?
Note: Remind students to check the instruction.

Additional questions

1. How did you know which number sentences to choose?
2. Explain why a subtraction number sentence could match the story.
3. Write other number sentences that match the story.
4. Explain the meaning of each number and each symbol in your number sentence.

Question 5

Chen wants to put some black tape around this box.
Each side of the box is 28 cm long.

Which one shows the length of tape Chen needs?

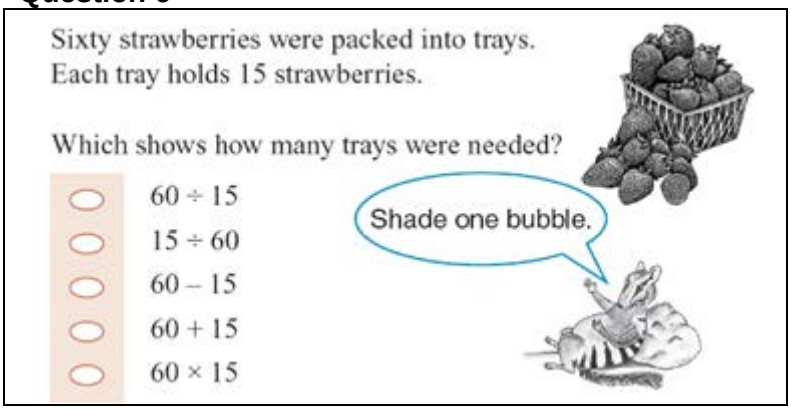
- ○ 28 + 28
- ○ 28 ÷ 4
- ○ 4 × 28
- ○ 4 – 28

Skill: Students choose the expression that matches a story.
Answer key: C

Additional questions

1. How many lengths of 28 cm are needed?
2. If you chose the first answer, ie 28 + 28, how much more tape would you need to go around the box?
3. Write a rule for the tape needed to go around a box of any dimensions. Can you write an algebraic expression?

Question 6



Skill: Students select the expression matching a story involving grouping.
Answer key: A

Additional questions

1. How did you know which expression is the correct one?
2. You have 60 strawberries and 15 trays. You want to put the same number of strawberries in each tray.
   - Which expression will you choose to solve this question?
   - Why does the same expression work?
3. Write a story to match each of the other expressions listed in Question 4

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number:* (book two):

- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties. p.20
  - Key understanding 3: Multiplying numbers is useful when we:
    - repeat equal quantities
    - use rates
    - make ratio comparisons or changes, e.g. scales
    - make arrays and combinations
    - need products and measures. p.28
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication. p.40

Student worksheet

Focus

Relating a number sentence to a story

Question 1

Marie had 12 biscuits. She then ate 2 and gave 3 to a friend.

How many biscuits does Marie have left?

7 ⬭ 8 ⬭ 9 ⬭ 17 ⬭

Question 2

In Year 4 there are 13 more girls than boys.
Trent knows there are 49 girls.

How can Trent work out the number of boys in Year 4?

- ⬭ add 49 to 13
- ⬭ subtract 13 from 49
- ⬭ multiply 13 by 49
- ⬭ divide 49 by 13

Question 3

Which of the following stories does **148 – 37** match?

- ⬭ There are 148 goats in one paddock and 37 goats in another paddock. What is the total number of goats?
- ⬭ There are 148 goats in each of 37 paddocks. How many goats are there altogether?
- ⬭ There are 148 goats that need to be put into 37 paddocks. How many goats will be in each paddock?
- ⬭ There are 148 goats in one paddock and 37 of them are put onto a truck. How many goats are left in the paddock?

Question 4

Mary bought 7 apples and Zac bought some more.
They have 13 apples altogether.

How many apples did Zac buy?

_____

Circle **all** the number sentences that match the story problem.

13 – 7 =?

7 + 13 =?

7 – 13 =?

7 + ? =13

Question 5

Chen wants to put some black tape around this box.
Each side of the box is 28 cm long.

Which one shows the length of tape Chen needs?

- ○ 28 + 28
- ○ 28 ÷ 4
- ○ 4 × 28
- ○ 4 – 28

Shade one bubble.

Question 6

Sixty strawberries were packed into trays.
Each tray holds 15 strawberries.

Which shows how many trays were needed?

- ○ 60 ÷ 15
- ○ 15 ÷ 60
- ○ 60 – 15
- ○ 60 + 15
- ○ 60 × 15

Shade one bubble.

Expressing equivalence

Background information/teaching focus

Some students interpret the = sign as 'makes' or a signal to find an answer. It is important to emphasise that the = sign means 'is equal to' and that both sides of an equation represent the same number.

Students can decide whether number sentences are true when they are confident with the properties of operations and relationships between them. This is an important part of number sense. It helps students decide whether an answer is reasonable. It is also the basis of algebraic thinking. Students need frequent opportunities to construct and rearrange number sentences into simplified forms to help solve equations and perform simple computations.

Students should use the understanding of properties and relationships to:

- Complete statements without finding the answer – putting in missing numbers
- Construct mathematical statements
- Check the truth of mathematical statements.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand Operations
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true.

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Western Australian Curriculum

- Year 4 – Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction (ACMNA083).
- Year 3 – Describe, continue, and create number patterns resulting from performing addition or subtraction (ACMNA060).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Students need a range of experiences in making equivalent statements. These experiences can include the use of equipment such as balance scales to model equivalence, through to the writing of equivalent number sentences.

For further ideas for activities see *First Steps in Mathematics: Number* (book two):

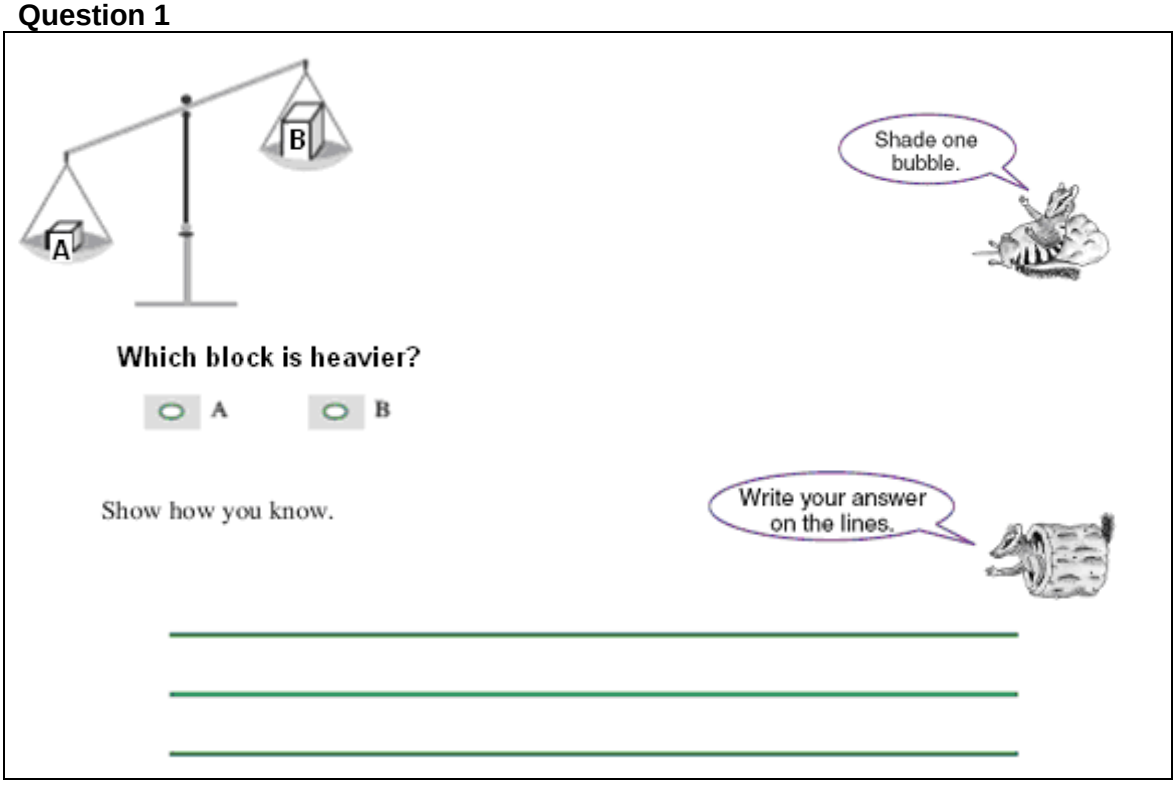
- Missing numbers p. 69
- Inequality statements p. 69
- Extension activity p. 69
- Equivalent statements p. 73
- Choose your numbers p. 69
- Bigger, smaller or equal p. 70

Revised October 2016

Numeracy online resources

- Year 4–5 Number: Understand operations
  Learning sequence 2
  Learning sequence 7

Question 1

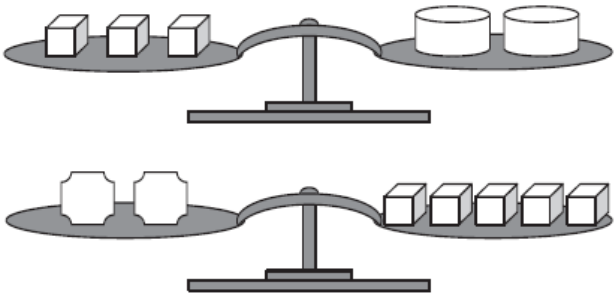


Skill: Students interpret balance scales.
Answer key: A; because **A** is lower; because **B** is higher

Additional questions

1. Draw the balance as it would look if the two blocks have the same mass.
2. Draw the balance as it would look if **B** is heavier.
3. Two **B** blocks balance one **A** block. Write an equation that represents this relationship (eg 2B = A)
4. If the mass of a **B** block is 100 g. What is the mass of an **A** block?

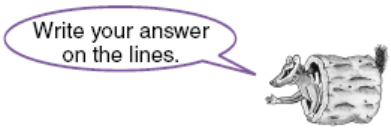
Question 2



How many cubes will balance the scales below?

- ○ 4
- ○ 5
- ○ 6
- ○ 7

Show how you know.

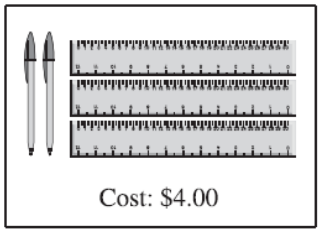


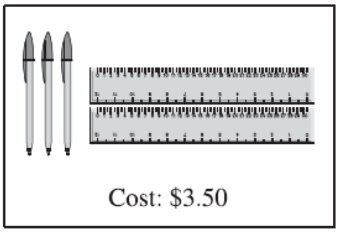
Skill: Students interpret equivalence using balance scales.
Answer key: A

Additional questions

1. How many cubes balance two cylinders and two octagonal shapes?
2. What shapes would be equivalent to 12 cubes in mass?
3. The mass of a cube is 10 g. What is the mass of a cube and an octagonal shape?
4. Use the shapes to draw some different ways the scales could be balanced. Make up some amounts in grams to apply to the shapes. Are there different values that could be applied to the shapes and still have them balance?

Question 3





How much altogether would one pen and one ruler cost?

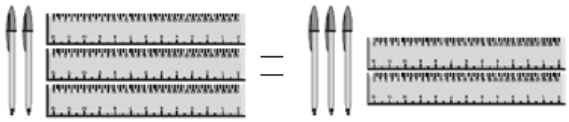
$ _____

Skill: Students work out equivalence using a supportive diagram.
Answer key: $1.50

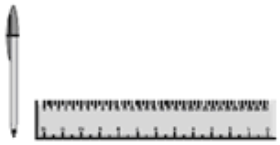
Additional questions

1. What strategies did you use to work out the costs?
2. What is the total cost of five rulers and five pencils?
3. What is more expensive – one ruler or one pencil? How do you know?
4. How much more would two rulers cost than two pens? How do you know?

Question 4



Two pencils and 3 rulers cost as much as 3 pencils and 2 rulers.



Cost: $4.00

A pencil and a ruler cost $4.
How much do 3 rulers and 2 pencils cost?

Skill: Students use equivalence to solve a problem.
Answer key: $10

Additional questions

1. How much would five pencils and five rulers cost? Why?
2. What is more expensive – one ruler or one pencil? How do you know?
3. Draw a balance scale to show the information in the first sentence.
   Use the scale to show that one pen costs as much as one pencil.

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct measure
  - Key understanding 1: We can directly compare objects and events to say which has more length, mass, capacity, area, volume, angle or time.

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

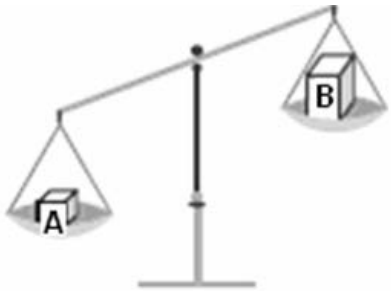
- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties. p.20
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true. p.66

Student worksheet

Focus

Using balance scales to express equivalence

Question 1



Shade one bubble.

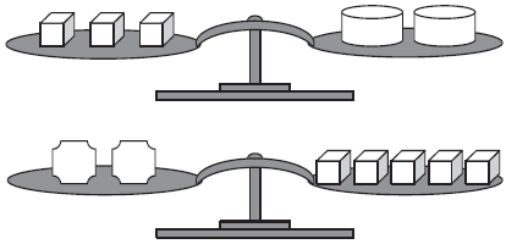
Which block is heavier?

○ A ○ B

Show how you know.

Write your answer on the lines.

Question 2



How many cubes will balance the scales below?

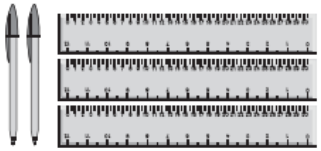
○ 4
○ 5
○ 6
○ 7

Shade one bubble.

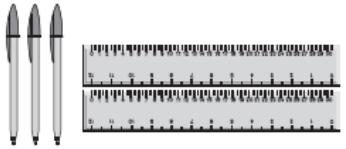
Show how you know.

Write your answer on the lines.

Question 3



Cost: $4.00

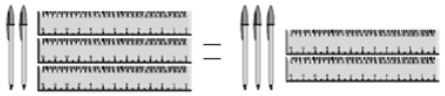


Cost: $3.50

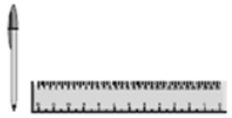
How much altogether would one pen and one ruler cost?

$ _____

Question 4



Two pencils and 3 rulers cost as much as 3 pencils and 2 rulers.



Cost: $4.00

A pencil and a ruler cost $4.
How much do 3 rulers and 2 pencils cost altogether? $_____

Number patterns with increasing and decreasing difference

Background information/teaching focus

Students should describe, continue and create a range of pattern types and their investigations of these patterns should include whole numbers, fractions and decimals. A systematic approach provides students with opportunities to recognise common pattern types. Students' attention should be drawn to:

- the similarities between certain patterns: looking for same and difference between various patterns leading to simple classification
- strategies that help to identify patterns.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 5: Reason about number patterns
  - Key understanding 4: There are strategies that help us become better at recognising common types of patterns.

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In the middle and later primary years, students can test a number sequence by finding the difference between successive terms to discover if they are constant.

- Is the difference constant? If not, is there a pattern in the differences between terms?
- Is the ratio (or multiplier) between the terms constant?
- Does doubling or halving each term make the pattern?
- Is the pattern made up of square numbers?
- If there are fractions, what is happening to the denominator/numerator? Would using a common denominator help?

Western Australian Curriculum

- Year 3 – Describe, continue, and create number patterns resulting from performing addition or subtraction (ACMNA060).
- Year 4 – Explore and describe number patterns resulting from performing multiplication (ACMNA081).
- Year 5 – Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction (ACMNA107).
- Year 6 - Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence (ACMNA133).

For more information visit the Western Australian Curriculum.

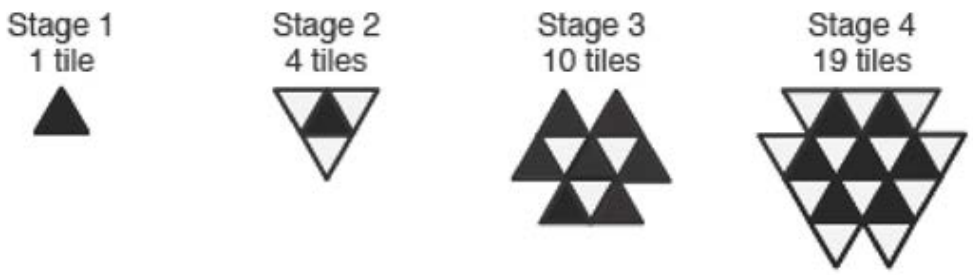
Learning experiences and activities

For further ideas for activities see *First Steps in Mathematics: Number* (book two):

- Constant function p. 237
- Function box p. 239
- Dot patterns p. 238

Question 1

Dave is making a pattern of tiles.
At each stage, tiles are added to edges that don't already have a tile on them as shown.



What is the total number of tiles needed for Stage 5?

22 28 31 33

Skill: Students identify patterns with a constant ratio (multiplier).
Answer key: 31

Additional questions

1. What stays the same and what changes between each shape in Dave's pattern?
2. Is there a constant increase in the number of tiles?
3. How many tiles would Dave need if he used hexagons to make a pattern using the same rule?

Question 2

? , 8, 16, 32, 64, 128, ...

Which is the first number in this pattern?

- 1
- 2
- 4
- 6

Skill: Students recognise a missing number in a doubling pattern.
Answer key: 4

Additional questions

1. How did you find the missing number?
2. To find the number after 128, what would you put in your calculator?
3. There are three more numbers that come before 1024. What are they?

Question 3

Mrs Adams made up a number pattern rule.
The rule was: **To find the next number, add 1 and double.**

She said, "Start with 3 and use the rule."

Which one shows this pattern?

- ○ 3, 4, 8, 9
- ○ 3, 6, 12, 24
- ○ 3, 8, 18, 38
- ○ 3, 7, 15, 31
- ○ 3, 8, 16, 32

Skill: Students apply a rule to construct a pattern.
Answer key: C

Additional questions

1. How did you work out the pattern?
2. Which answers could have been right after the first use of the rule?
3. Which answers could have been right after the second use of the rule?
4. Write the 5th term in the pattern.
5. Danni wants to use the rule 10 times. She thinks that she could work out the 11th term without repeating the rule over and over again.
   Is she right? How do you know?

Question 4

Here is a number pattern.

1, 4, 9, 16, ? , 36

One of the numbers is missing.

Which is the missing number?

- ○ **20**
- ○ **23**
- ○ **25**
- ○ **26**

Skill: Students recognise and continue a number pattern.
Answer key: 25

Additional questions

1. How did you work out which number is correct?
2. What are these special numbers called? Use grid paper to show how the pattern increases.
3. What if, instead of starting with 1 square and increasing by one wide and one long, you started with **two squares** then increased by **one wide** and **one long**.
   What would that number pattern look like?
4. Use blocks to make and explore 2D and 3D number patterns.

Question 5

Tom started this increasing pattern:

1, 3, 7, 13, 21, 31, 43

a) Describe how he could have made the pattern.

b) What could be the next number in Tom's pattern?

Skill: Students describe a pattern in their own words.
Answer key:
a) The number he adds increases by 2 each time.
b) 57

Additional questions

1. What is the difference between each of the numbers?
   How could the difference help explain the pattern?
2. Can you predict the next number in the pattern?
3. What are some different ways you can tell someone how to make the pattern?
4. a) Gary made this table to show how each term in the pattern changes:

Term number	1	2	3	4
Term value	1	3	7	13

   b) Would the table help him to work out the pattern?
5. Jane used the same rule as Gary but **started** with the number **2**.
   What are the first three terms in Jane's pattern?

Question 6

What rule is being used to make this number pattern?

1342, 134.2, 13.42, 1.342 …

- ○ divided by 100
- ○ multiplied by 100
- ○ divided by 10
- ○ multiplied by 10

Skill: Students identify patterns created by whole and decimal numbers divided by 10.
Answer key: C

Additional questions

1. What happens to the value of 1 342 when it is divided by 10?
2. What do you notice about the position of the decimal point in each of the numbers in this pattern?
3. What happens to the place value of each number in the sequence?
4. How many hundredths are in the last number?
5. Describe what a hundredth is.
6. What number would you get if you divided it by 10 again?
7. Start with the number 113 342 and create a number pattern with three numbers in the sequence but this time divide it by 100 each time.

Question 7

4450, 4410, ? , 4330 …

The missing number is: _____

Skill: Students identify the missing element of a pattern involving subtraction.
Answer key: 4370

Additional questions

1. How did you work out the missing number?
2. What would the next number in the pattern be?
3. How could you find the 7th number in the pattern?
4. Create your own decreasing number pattern with a missing term. Ask a friend to find the missing term.

Question 8

Create a number pattern with 5 numbers that follows the rule:
Multiply by 5 and add 2

My number pattern is:

_____ , _____ , _____ , _____ , _____ …

Skill: Students create a two-step number pattern.
Answer key: Answers will vary. Check that the students' pattern follows the rule given.

Additional questions

1. Explain why you chose the numbers you used.
2. Would your number pattern be easy to solve if you gave it to a friend? Why/why not?
3. How can you tell that a number pattern may involve two steps?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number:* (book 2)

- Chapter 5: Reason about number patterns
  - Key understanding 1: We use regularity or pattern to infer one thing from another and to make predictions.
  - Key understanding 2: Representing aspects of a situation with numbers can make it easier to see patterns in the situation.
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern.

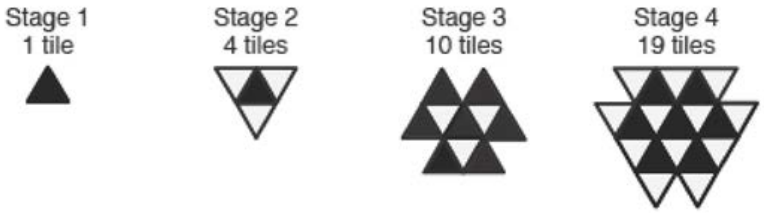
Student worksheet

Focus

Number patterns with increasing difference

Question 1

Dave is making a pattern of tiles.
At each stage, tiles are added to edges that don't already have a tile on them as shown.



What is the total number of tiles needed for Stage 5?

- 22
- 28
- 31
- 33

Question 2

? , 8, 16, 32, 64, 128, ...

Which is the first number in this pattern?

- 1
- 2
- 4
- 6

Question 3

Mrs Adams made up a number pattern rule.
The rule was: **To find the next number, add 1 and double.**

She said, "Start with 3 and use the rule."

Which one shows this pattern?

- 3, 4, 8, 9
- 3, 6, 12, 24
- 3, 8, 18, 38
- 3, 7, 15, 31
- 3, 8, 16, 32

Question 4

Here is a number pattern.

1, 4, 9, 16, ? , 36

One of the numbers is missing.

Which is the missing number?

- **20**
- **23**
- **25**
- **26**

Question 5

Tom started this increasing pattern:

1, 3, 7, 13, 21, 31, 43

c) Describe how he could have made the pattern.

d) What is the next number in Tom's pattern?

Question 6

What rule is being used to make this number pattern?

1342, 134.2, 13.42, 1.342 …

- ○ divided by 100
- ○ multiplied by 100
- ○ divided by 10
- ○ multiplied by 10

Question 7

4450, 4410, ? , 4330 …

The missing number is: _____

Question 8

Create a number pattern with 5 numbers that follows the rule:
Multiply by 5 and add 2

My number pattern is:

_____ , _____ , _____ , _____ , _____ …

Number sentences involving multiplication

Background information/teaching focus

In order to complete number sentences and move flexibly between equivalent number sentences students need to develop an understanding of the properties of operations and the connections between them. This understanding allows students to manipulate numbers and operations to make calculating easier.

Using the properties of operations and the relationships between them enables us to construct and rearrange number sentences into simplified forms. This manipulation helps us solve equations and simplify computations and is the foundation for algebraic thinking.

Explicit teaching is needed to ensure students understand that the equals sign (=) in an equation is about equality and does not just signify 'the answer'. Modelling with materials or grid paper and talking through examples such as 36 + 24 = 30+ 30; 23 = 15+ 7, may assist students to develop this idea.

Students need to interpret realistic situations to develop their understanding of the use of brackets. When a problem has no context the BIMDAS rules is applied. BIMDAS (brackets, indices, multiplication/division, addition/subtraction) is often used to help students remember the order of operations. There are variations of this acronym including BIDMAS and BODMAS.

The convention for simplifying expressions stipulates that multiplication and division are performed before addition and subtraction and in order from left to right. For example, in 5 - 6 ÷ 2 + 7 x 2 = ___, the division and the multiplication are performed first and the equation becomes 5 – 3 + 14 = 16. If the convention is ignored and the operations are performed in order, an incorrect result can be obtained. The use of brackets helps to write number sentences more clearly. For example, 5 – (6÷2) + (7x2). Students need opportunities to write their own mathematical expressions to represent various situations.

For further related information see, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 7: Properties of operations and relationships between them can help us decide whether number sentences are true. p.66

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Western Australian Curriculum

- Year 5 – Find unknown quantities in number sentences involving multiplication and division and identify equivalent number sentences involving multiplication and division (ACMNA121).
- Year 6 – Explore the use of brackets and order of operations to write number sentences (ACMNA134).

- Year 7 - Extend and apply the laws and properties of arithmetic to algebraic terms and expressions (ACMNA177).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Provide students with opportunities to represent multiplication number sentences as arrays. Students can then manipulate arrays to create different partitions to investigate equivalent number sentences.
- Provide students with a completed multiplication or division sentence, eg 45 x 5 = 235. Students use inverses to find missing numbers in equivalent number sentences, eg 235 ÷ ? = 5
- Today's number is – Teacher identifies a number for the day. Students write true number sentences that result in the number of the day. Encourage students to use their knowledge about the operations, rather than calculating.

For further ideas for activities see *First Steps in Mathematics: Number* (book two):

- Multiplication and division p. 70
- Checking work p. 70
- What do you know? p. 71
- Broken keys p. 71
- Bigger, smaller or equal p. 71
- Equivalent statements p. 73

Numeracy online resources

- Year 6–7 Number: Understand operations
  Learning sequence 6

Question 1

Which one of the following gives the same result as 43 + 43 + 43?

- ○ 43 x 3
- ○ 43 ÷ 3
- ○ 43 - 43 - 43
- ○ 43 + 43

Skill: Students link repeated addition and multiplication.
Answer key: A

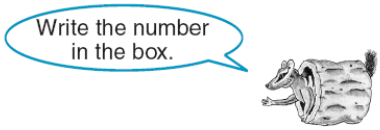
Additional questions

1. Write 43 + 43 + 43 + 43 using multiplication only.
2. Write 4 x 35 using addition only.
3. James calculated 43 x 3 using his calculator. From the answer he subtracted 43, then added 43, and then subtracted 43. What is his answer?

Question 2

Fill in the missing number.

$5 + 5 + 5 + 5 - \mathbf{5} = \square \times 5$



Skill: Students link repeated addition and multiplication in a number sentence.
Answer key: 3

Additional questions

1. How many fives are left after the 5 is taken away?
2. If the last five was added, instead of subtracted, what would be the number in the box?
3. Fill in the missing number in 5 + 5 + 5 + ☐ × 4.
   How did you know what was missing?
4. What difference would it make if it was 5 + 5 + 5 + 5 = ☐

Question 3

Complete the number sentence correctly.

(26 − _____) × 3 = 60

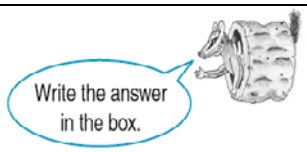
Skill: Students recall known facts to complete a number sentence.
Answer key: 6

Additional questions

1. Three lots of something make 60. How will this help solve the problem?
2. How did you work out which number is missing?
3. Would the answer be different if it was 3 × (26 – ___) = 60 ?
4. Use different numbers to finish this number sentence
   (___ – ____) × 3 = 60.
5. What could the missing numbers be in this number sentence.
   (___ + ____) × 3 = 60.
6. My number times 3 gives 60. What is the last digit of my number?

Question 4

$3 \times 5 + 7 \times 5 = \square \times 5$



Skill: Students use the distributive law.
Answer key: 10

Additional questions

1. How many lots of five do you need altogether to make the number sentence true?
2. What are some other ways you can split up the 10 lots of five?
   (Have students use grid paper to help them see why this works. Cut out a 10 × 5 rectangle, then cut it into two parts in different ways to make equivalent statements.)
3. Fill in the missing number in 3 × 10 + 2 × 10 = ___ × 5.
   Why must the missing number multiplied by five be the same as for 3 × 5 + 7 × 5? What other ways could you split 5 x 10 and also 10 x 5? Use grid paper to show that the quantities must be equal.

Curriculum references

Department of Education and Training Western Australia, 2004, *First Steps in Mathematics: Number:* (book two):

- Chapter 3: Understand operations
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true. p.66

Student worksheet

Focus

Number sentences involving multiplication

Question 1

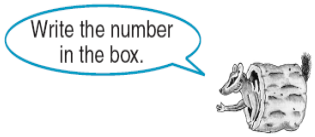
Which one of the following gives the same result as 43 + 43 + 43?

- ○ 43 x 3
- ○ 43 ÷ 3
- ○ 43 - 43 - 43
- ○ 43 + 43

Question 2

Fill in the missing number.

$5 + 5 + 5 + 5 - 5 = \square \times 5$



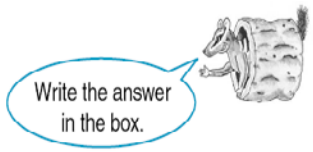
Question 3

Complete the number sentence correctly.

$(26 - \_\_\_\_\_) \times 3 = 60$

Question 4

$3 \times 5 + 7 \times 5 = \square \times 5$



Calculations involving division

Background information/teaching focus

Students should learn that the division operation is appropriate for problems when you know the quantity and the number of portions to be formed from it, and you want to know how many will be in each portion. Students should also learn to use division for problems where you know the quantity and how many or how much is to be in each portion and you want to find out how many portions.

Students should also be encouraged to discuss the meaning of division and the language patterns associated with its different problem types. The understanding of the inverse relationship between multiplication and division should also receive careful attention. There are division problems associated with rates, ratio comparisons or changes, arrays and combinations and products of measures. Students need to recognise and solve all of the problem types.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication. p.40
- Chapter 4: Calculate
  - Key understanding 3: We can think of a number as a multiplication or division in different ways. We can rearrange the factors of a multiplication without changing the quantity. p.114
  - Key Understanding 4: Place value and basic number facts together allow us to calculate with any whole or decimal numbers. p.122

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Western Australian Curriculum

- Year 4 – Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder (ACMNA076).
- Year 4 – Solve word problems by using number sentences involving multiplication or division where there is no remainder (ACMNA082).
- Year 5 – Solve problems involving division by a one digit number, including those that result in a remainder (ACMNA101).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Division target practice*:* Students form groups of four and collect three dice. One person chooses a target number less than 100 and throws all of the dice. Each student writes a number sentence that results in a number as close to the target as possible. Double points are scored for use of division.

- Investigating division: Make individual division question packs ensuring that the different division types, (eg rates, ratio comparisons or changes, arrays and combinations and products of measures) are covered. Include the question and a range of materials (such as counters or grid paper) in each pack. Students work in pairs to discuss how they would each solve the problem. Solve and swap problems with other pairs. Debrief some of the problems at the end of the lesson. Ask students to paraphrase the problems they worked on and to explain their solutions.
- Missing numbers: Using empty boxes, students explore and identify all possible solutions, eg □0 ÷ □ = □; □□ ÷ 5 = □□. Record responses.

The following activities are from *First Steps in Mathematics: Number* (book two):

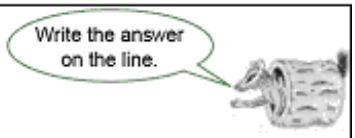
- Sharing and grouping p. 44
- Array model p. 45
- Relay p. 45
- Sample lesson 2: Relay p. 48
- Sharing sweets p. 119
- Pass the number p. 120
- How did you do it? p. 138

Numeracy online resources

- Year 4-5 Number: Calculate
  Learning sequence 2
  Learning sequence 6

Question 1

Three friends shared 27 lollies equally.



How many lollies did they each get? _____

Skill: Students solve a division word problem.
Answer key: 9

Additional questions

1. How did you work out the answer?
2. What would you put in your calculator to find the answer?
3. Alex wrote these number sentences to represent the problem:
   3 × ? = 27 and 27 ÷ 3 =?
   Then he also wrote **? × 3 = 27 or 27÷? = 3**
   Who thinks that these number sentences can also represent the problem?
   Ask students to explain why they think they do, or do not, represent the problem.

Question 2

Which of the following means the same as $50 \div 10$?

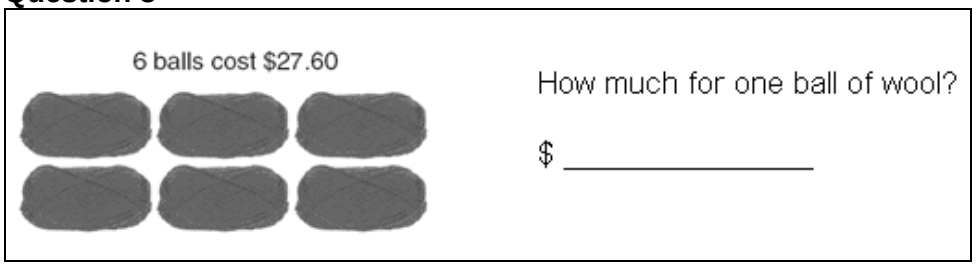
- ○ What is ten divided by fifty?
- ○ What are fifty groups of ten?
- ○ How many fifties are in ten?
- ○ How many tens are in fifty?

Skill: Students recognise language associated with division.
Answer key: D

Additional questions

1. Describe **50 ÷ 10** in different ways. What words do we use to indicate division?
2. Write the two multiplication number sentences that match **50 ÷ 10 =** ?
3. Show an addition number sentence to match **50 ÷ 10 =** ?
4. Jane wrote: 50 – 10 – 10 – 10 – 10 – 10 = 0.
   She thinks this is the same as **50 ÷ 10 = ?**
   Is she right? Explain why.

Question 3

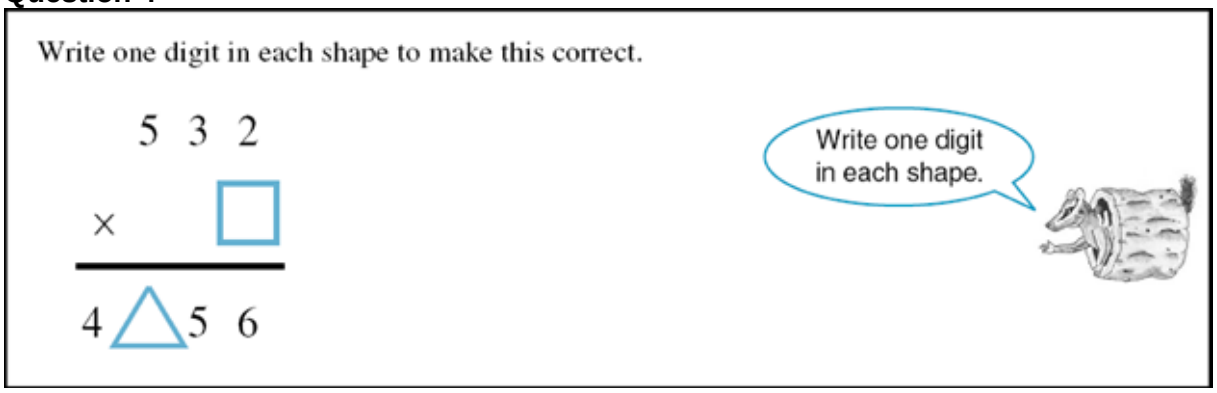


Skill: Students use division in a money context.
Answer key: $4.60

Additional questions

1. How did you work out the cost of one ball?
2. What would you put into your calculator to get this answer?
3. Write three different number sentences that you could use to represent the problem.

Question 4



Skill: Students use links between multiplication and division.
Answer key: 8, 2

Additional questions

1. Bob said that the number in the square could be three or eight. How does he know?
2. The number in the square cannot be three. Why?
3. Write the question above using division. Explain why this works.
4. Show how you could find the answer using repeated doubling?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication. p.40

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Student worksheet

Focus

Calculations involving division

Question 1

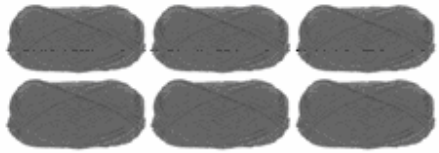
Three friends shared 27 lollies equally.

Write the answer on the line.

How many lollies did they each get? _____

Question 3

6 balls cost $27.60



How much for one ball of wool?

$ _____

Question 2

Which of the following means the same as $50 \div 10$?

- ○ What is ten divided by fifty?
- ○ What are fifty groups of ten?
- ○ How many fifties are in ten?
- ○ How many tens are in fifty?

Shade one bubble.

Question 4

Write one digit in each shape to make this correct.

$$\begin{array}{r} 5\ 3\ 2 \\ \times\quad \square \\ \hline 4\ \triangle\ 5\ 6 \end{array}$$

Write one digit in each shape.

Revised October 2016

Maintaining equivalence in a computation

Background information/teaching focus

Some students interpret the = sign as 'makes' or a signal to find an answer. It is important to emphasise that the = sign means 'is equal to' and that both sides of an equation represent the same number.

Students can decide whether number sentences are true when they are confident with the use of the properties of operations and relationships between them. This is an important part of number sense. It helps students decide whether an answer is reasonable. It is also the basis of algebraic thinking and is therefore the foundation for further mathematical progress. Students need frequent opportunities to construct and rearrange number sentences into simplified forms to help solve equations and perform simple computations.

Students should use the understanding of properties and relationships to:

- Complete statements without finding the answer – putting in missing numbers
- Construct mathematical statements
- Check the truth of mathematical statements.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true.

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Western Australian Curriculum

- Year 4 – Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction (ACMNA083).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Students need to have a range of experiences in making equivalent statements. This can include solving problems by 'playing out' or modelling them in various ways – dramatically, physically, mentally and with drawings – and then counting.

For further ideas for activities see *First Steps in Mathematics: Number* (book two):

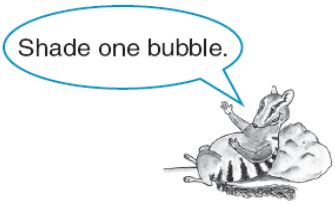
- Missing numbers p. 69
- Inequality statements p. 69
- Extension Activity p. 69
- Choose your numbers p. 69
- Bigger, smaller or equal p. 70
- Equivalent statements p. 73

Numeracy online resources

- Year 4–5 Number: Understand operations
  Learning sequence 7

Question 1

$6 \times 4 =$



Which one makes the number sentence above true?

- ○ $6 \div 4$
- ○ $4 + 6$
- ○ $4 - 28$
- ○ $28 - 4$

Skill: Students select an expression to create equality.
Answer key: D

Additional questions

1. How did you choose the correct answer?
2. **6 × 4 = 20 + 4.** Write a different addition expression to make this number sentence true.
3. **6 × 4 = 28 – 4.** Write a different multiplication expression to make this number sentence true.
4. **6 × 4 = 48 ÷ 2.** Write a different division expression to make this number sentence true.
5. Complete this number sentence: **28 – 4 = 3 +? × 3**

Question 2

What is the missing number?

6 x 4 = 3 x ☐

Skill: Students use multiplication to maintain equivalence.
Answer key: 8

Additional questions

1. How did you decide on the missing number?
2. John used factors to work out the missing number.
   Use John's method to find the missing number.
3. Draw an 8 x 3 rectangle on grid paper.
   Cut the rectangle in half and rearrange the parts to make a new rectangle.
   What are the length and width of your rectangle?
4. Put a tick on the number sentences on which you could use halving and doubling to find the missing number:
   a) 2 x ? = 4 x 5
   b) 3 x ? = 6 x 2
   c) ? x 5 = 6 x 4
   d) 5 x 9 = 3 x ?

Question 3

Write the missing digit in the box.

4	×		2	=	2	0	8

Skill: Students maintain equivalence using numbers into the hundreds.
Answer key: 5

Additional questions

1. How did you work out the missing number?
2. How could knowing **4 x 5 = 20** help you work out the missing number?
3. How would partitioning 208 into **200 + 8** help work out the missing number?
4. Use different strategies to find the missing digit in the number sentence below:

5	×	?	3	=	4	1	5

Question 4

$$(37 + \boxed{?}) \times 3 = 135$$

$$\boxed{?} = \underline{\qquad\qquad}$$

Skill: Students recognise the use of brackets in an equation.
Answer key: 8

Additional questions

1. How did you calculate the missing number?
2. What would you put in your calculator to solve the problem?
3. How would dividing 135 by 3 help?
4. How would multiplying 37 by 3 help?

Curriculum references

Department of Education and Training Western Australia, 2004, *First Steps in Mathematics: Number:* (book two)

- Chapter 3: Understand operations
  - Key understanding 6: The same operation can be said and written in different ways. p.62
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true. p.66
  - Key understanding 8: Thinking of a problem as a number sentence often helps us to solve it. Sometimes we need to rewrite the number sentence in a different but equivalent way. p.74

Student worksheet

Focus

Maintaining equivalence in a computation

Question 1

$6 \times 4 =$

Shade one bubble.

Which one makes the number sentence above true?

- ○ $6 \div 4$
- ○ $4 + 6$
- ○ $4 - 28$
- ○ $28 - 4$

Question 2

What is the missing number?

$6 \times 4 = 3 \times \square$

Question 3

Write the missing digit in the box.

Write the digit in the box.

4	×		2	=	2	0	8

Question 4

$(37 + \boxed{?}) \times 3 = 135$

$\boxed{?} = \_\_\_\_\_$

Finding missing numbers using the four operations

Background information/teaching focus

Within a mathematical context, to describe a number pattern means to provide an unambiguous rule or relationship that produces it. Students should be able to follow rules provided by others, create rules for themselves and produce rules that fit the information provided. There are some conventional mathematical types of rules that students should begin to use in the primary years. For example:

- Sequences of numbers can be described by giving a rule that says where to start and how to get from any number in the sequence to the next one. For example: Start with 7. Each number after that is five more than the one before (7, 12, 17, 22 …)
- Sequences of numbers can also be described by giving a general rule that says how to work out any number in the sequence by knowing what its position in the sequence is. For example: Each number in the sequence is two added to five times its position (7, 12, 17, 22 …)
- Other patterns can be described by rules that say what the general relationship is between two quantities, eg the area of a square is the square of the length of one side.

Students in the middle years should learn to clarify and refine their descriptions of patterns and rules so that another person can accurately recreate the sequence.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 5: Reason about number patterns
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern. p.224

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Western Australian Curriculum

- Year 4 – Find unknown quantities in number sentences involving addition and subtraction and identify equivalent number sentences involving addition and subtraction (ACMNA083).
- Year 5 – Find unknown quantities in number sentences involving multiplication and division and identify equivalent number sentences involving multiplication and division (ACMNA121).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Students need to develop a deep understanding of the four operations. They need the opportunity to explore the relationships and problems can be represented in a variety of ways.
  - experienced-based scripts of real world events
  - manipulatives
  - pictures and diagrams

- written symbols in number sentences
- Students need the opportunity to explore the importance of the order of operations and how the order can produce different results. The order of operations requires that an operation in brackets is completed first, then multiplication and division from left to right, then addition and subtraction (BIMDAS).

For ideas for activities see *First Steps in Mathematics: Number* (book two):

- Today's number is… p. 69
- Choose your numbers p. 69
- How many p. 215
- What's next p. 217
- Triangular numbers p. 217
- Recording p. 226
- What's next p. 226
- What's my rule? p. 226
- Function box p. 228
- Pattern patterns p. 239
- Sticky instructions p. 239

Question 1

Lydia starts with a number.
She doubles it and then subtracts 4 to get an answer of 8.

What number did Lydia start with?

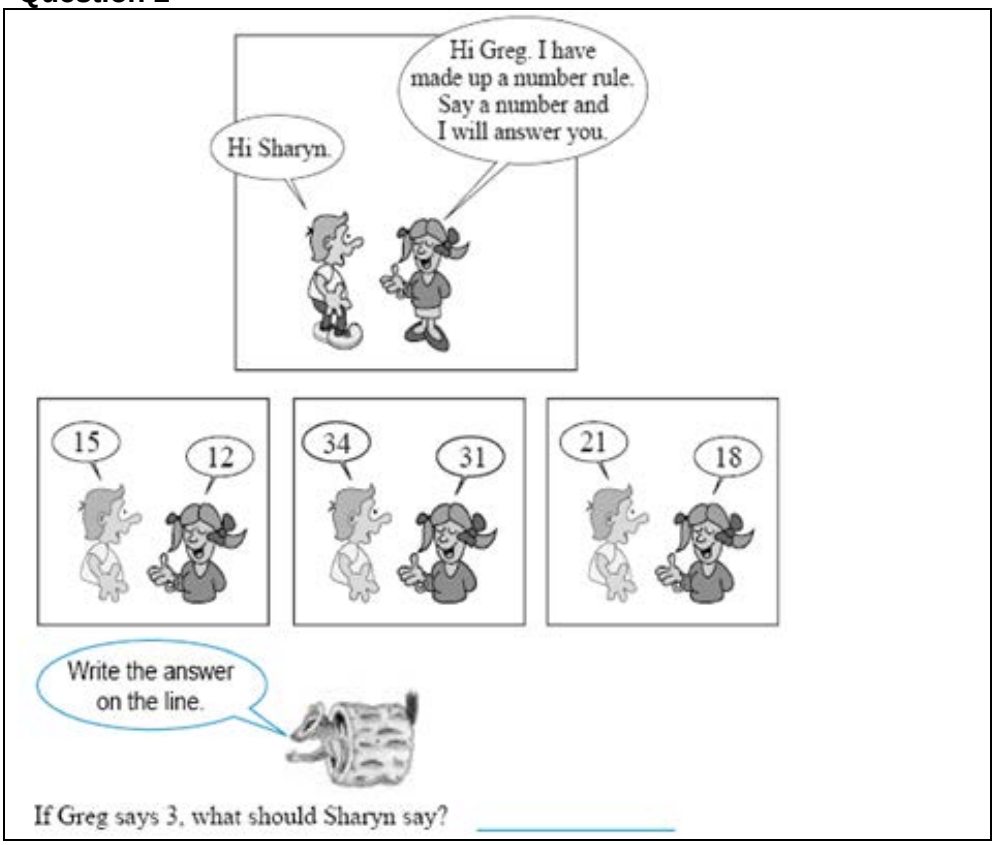
6	8	12	24
⬭	⬭	⬭	⬭

Skill: Students find links between operations to find a starting number.
Answer key: 6

Additional questions

1. How did you decide what the answer would be?
2. Ask students to create their own problems using different numbers.
3. Represent the problem semantically and ask students to suggest ways to solve it. Try out their suggestions and talk about which strategies worked.

Question 2



Skill: Students identify and use a simple rule based on subtraction.
Answer key: 'Zero'

Additional questions

1. What is Sharyn's rule?
2. Make up a rule for a partner. They give you a number, apply your rule and give them the new number – Did they guess your rule?
3. If the rule was to add 3 and Greg says 15, what would Sharyn say?

Question 3

When I doubled a number and added 13, the answer was 29.

What was the number?

- ○ 4
- ○ 8
- ○ 16
- ○ 42

Skill: Students use links between the four operations in a familiar context.
Answer key: 8

Additional questions

1. How did you work out the starting number?
2. What if the starting number was tripled before adding the 13?
3. How would you work out the starting number?
4. In your own words, explain how halving and subtracting relate to doubling and adding. Explain using some examples.

Question 4

Joanne started with a number.
She halved it.
Then she took away 4.
The answer was 3.

What was Joanne's starting number?

- ○ 10
- ○ 12
- ○ 14
- ○ 16

Skill: Students understand and use the links between the four operations.
Answer key: 14

Additional questions

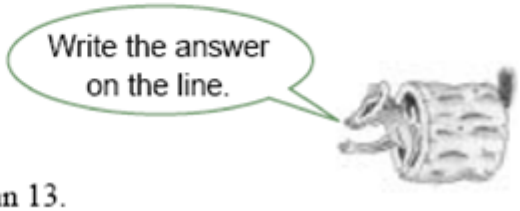
1. How did you work out the starting number?
2. Why would adding 4 to 3 and then doubling that number result in the starting number?
3. What would the starting number be if it was halved, then 5 was subtracted, and the answer was 8?
4. Make up your own problems using halving, doubling, addition and subtraction.

Question 5

Here are some post boxes.

Nick's post-box number is:

less than 60,
more than 5×11,
an odd number, and
the sum of the digits is less than 13.



Nick's post-box number is _____ .

Skill: Students use the four operations to identify a number with specific properties.
Answer key: 57

Additional questions

1. How did you work out the number? What did you do first, next?
2. Between which numbers must the answer be after the second step (5 × 11)?
3. If the answer was an **even** number, and the other conditions stayed the same, what would Nick's post-box number be?
4. Try to write a set of criteria to result in a 'secret number' and give to a partner to solve.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number:* (book two):

- Chapter 3: Understand operations
  - Key understanding 7: Properties of operations and relationships between them can help us to decide whether number sentences are true. p.66
- Chapter 5: Reason about number patterns
  - Key understanding 1: We use regularity or pattern to infer one thing from another and to make predictions. p.200
  - Key understanding 2: Representing aspects of a situation with numbers can make it easier to see patterns in the situation. p.212
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern. p.224
  - Background notes p. 258

Student worksheet

Focus: Finding missing numbers using the four operations

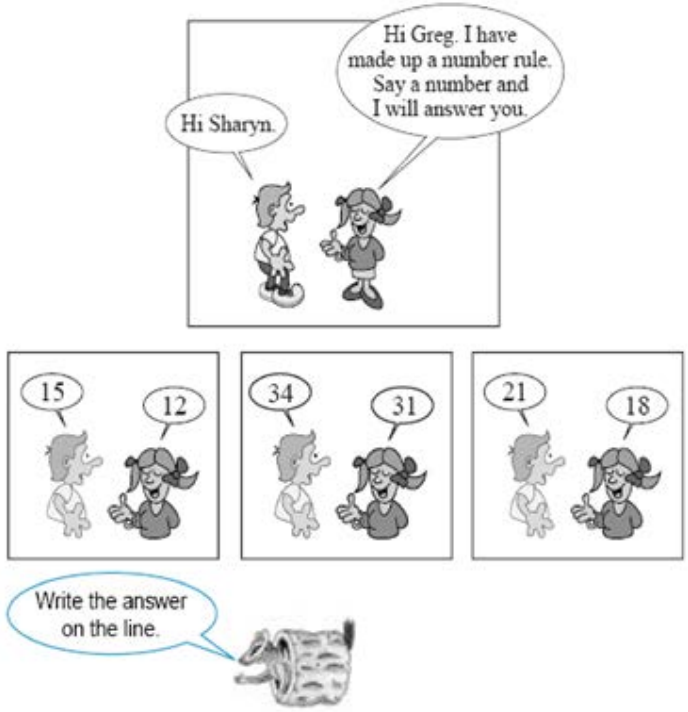
Question 1

Lydia starts with a number.
She doubles it and then subtracts 4 to get an answer of 8.

What number did Lydia start with?

6	8	12	24
⬭	⬭	⬭	⬭

Question 2



If Greg says 3, what should Sharyn say? _____

Question 3

When I doubled a number and added 13, the answer was 29.

What was the number?

- ⬭ 4
- ⬭ 8
- ⬭ 16
- ⬭ 42

Question 4

Joanne started with a number.
She halved it.
Then she took away 4.
The answer was 3.

What was Joanne's starting number?

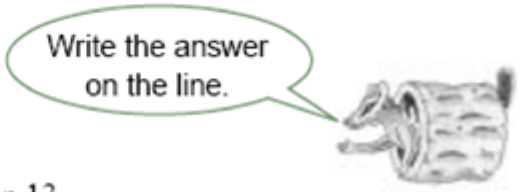
- ⬭ 10
- ⬭ 12
- ⬭ 14
- ⬭ 16

Question 5

Here are some post boxes.

Nick's post-box number is:

less than 60,
more than 5×11,
an odd number, and
the sum of the digits is less than 13.



Nick's post-box number is _____ .

Finding missing numbers using decimals or fractions

Background information/teaching focus

Within a mathematical context, to describe a number pattern means to provide an unambiguous rule or relationship that produces it. Students should be able to follow rules provided by others, create rules for themselves and produce rules that fit the information provided.

There are some conventional mathematical types of rules that students should begin to use in the primary years. For example:

- Sequences of numbers can be described by giving a rule that says where to start and how to get from any number in the sequence to the next one. For example: Start with 7. Each number after that is five more than the one before (7, 12, 17, 22 …)
- Sequences of numbers can also be described by giving a general rule that says how to work out any number in the sequence by knowing what its position in the sequence is. For example: Each number in the sequence is two added to five times its position (7, 12, 17, 22 …)
- Other patterns can be described by rules that say what the general relationship is between two quantities. For example: The area of a square is the square length of its side.

Students in the middle years should learn to clarify and refine their descriptions of patterns and rules so that another person can accurately recreate the sequence.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 5: Reason about number patterns
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern.

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Western Australian Curriculum

- Year 3 – Describe, continue, and create number patterns resulting from performing addition or subtraction (ACMNA060).
- Year 4 – Explore and describe number patterns resulting from performing multiplication (ACMNA081).
- Year 5 – Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction (ACMNA107).
- Year 6 – Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence (ACMNA133).

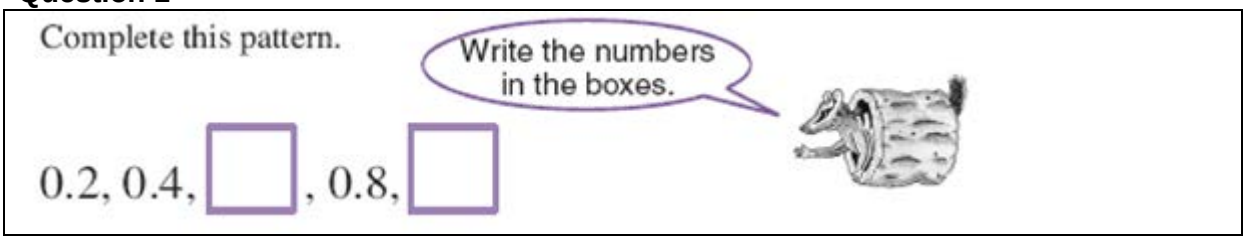
For more information visit the Western Australian Curriculum.

Learning experiences and activities

For ideas for activities see *First Steps in Mathematics: Number* (book two):

- Copying decimals p. 207
- Money patterns p. 220
- Function box (2) p. 227
- Calculator patterns 2 p. 228
- Constantly adding tens p. 246

Question 1

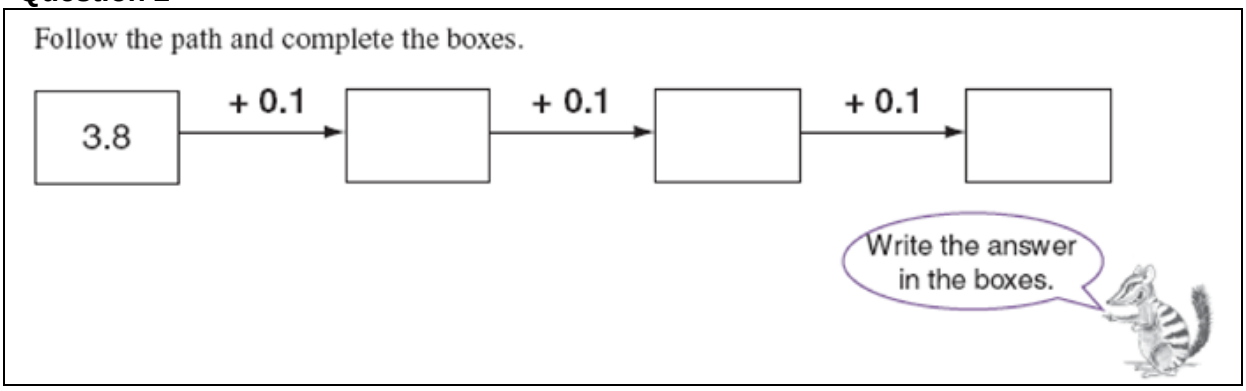


Skill: Students recognise and continue a number patter based on decimals.
Answer key: 0.6; 1

Additional questions

1. What did you do to get from one term to the next?
2. List the next three terms in the pattern.
3. What is the **tenth** term **after** 0.8?

Question 2



Skill: Students use addition of decimals with the same number of decimal places.
Answer key: 3.9; 4; 4.1

Additional questions

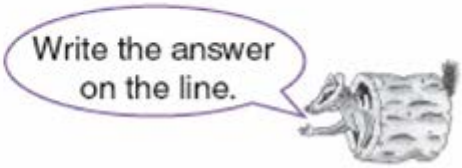
1. What number would you get if you continued the path for five more boxes?
2. Complete the boxes if the rule was to add 0.3 each time.
3. Complete the boxes if the rule was to add 0.3, then 0.6 and then 0.9.

Question 3

What is the missing amount in this sequence?

$1.20, $2.65, $4.10, ? , $7.00, $8.45

$ _____



Skill: Students identify and continue a number pattern in a money context.
Answer key: $5.55

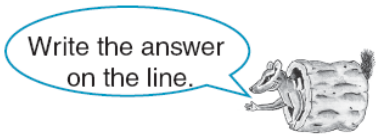
Additional questions

1. How did you work out your answer?
2. List the next three terms in the pattern.
3. What will be the first term in the pattern that is greater than $20? Which term is it?

Question 4

Write a number on the line to complete the pattern.

1.8, 2.6, 3.8, _____ , 5.8, 6.6



Skill: Solve identify and continue a number pattern based on decimals.
Answer key: 4.6

Additional questions

1. Describe how this pattern works.
2. List the next three terms of this pattern.
3. Craig worked out that to get the third term after 6.6 he only had to add 2.8. Is Craig correct?
4. Use Craig's rule to write down the sixth term after the 6.6. Check your answer by listing.
5. To get the third term after 5.8 Craig added 2.8 to 5.8? Would he be correct? Why?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 5: Reason about number patterns
  - Key understanding 1: We use regularity or pattern to infer one thing from another and to make predictions. p.200
  - Key understanding 2: Representing aspects of a situation with numbers can make it easier to see patterns in the situation. p.212
  - Key understanding 3: To describe a number pattern means to provide a precise rule that produces the pattern. p.224

Student worksheet

Focus

Finding missing numbers using decimals or fractions

Question 1

Complete this pattern.

Write the numbers in the boxes.

0.2, 0.4, ☐, 0.8, ☐

Question 2

Follow the path and complete the boxes.

3.8 → + 0.1 → ☐ → + 0.1 → ☐ → + 0.1 → ☐

Write the answer in the boxes.

Question 3

What is the missing amount in this sequence?

$1.20, $2.65, $4.10, ? , $7.00, $8.45

$ _____

Write the answer on the line.

Question 4

Write a number on the line to complete the pattern.

1.8, 2.6, 3.8, ____ , 5.8, 6.6

Write the answer on the line.

Reading and comparing whole numbers up to hundreds of thousands

Background information/teaching focus

Students should be supported to create and order large and small numbers and to justify their reasoning based on place value. Use 'think alouds' or paraphrase students' explanations if students struggle to explain their reasoning, eg I know this number is larger because the digit in the ten thousands place means 40 000. The other number only has a 2 in the ten thousands place. That means it has value of 20 000. The other digits for both numbers are in the thousands, hundreds, tens and ones place, which are less than ten thousands.

Students should begin to think of numbers independently of any particular context and to use place value to compare and order the numbers themselves without referring to the actual quantities.

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal number
  - Key understanding 8: We can compare and order the numbers themselves p. 74

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Western Australian Curriculum

- Year 3 – Recognise model, represent and order numbers to at least 10 000 (ACMNA052).
- Year 4 – Recognise, represent and order numbers to at least tens of thousands (ACMNA072).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Use of hundreds charts, number lines (extending to vertical number lines) and physical materials in learning experiences provide students with appropriate support in comparing numbers.
- Give each student a number on a card (vary from large to small numbers) and ask them to sort themselves into groups and justify why they are in that group. Then re-sort themselves in a different way according to different criteria. Students can also arrange themselves in order from smallest to biggest or place themselves on a number line (draw on ground or use a long string or rope).
- Students find numbers in newspapers of magazines and record "what is one more (less), 5 more (less), 10 more (less), 100 more (less) etc". They can also order or group the numbers they have found.

For further activity ideas see *First Steps in Mathematics: Number* (book one):

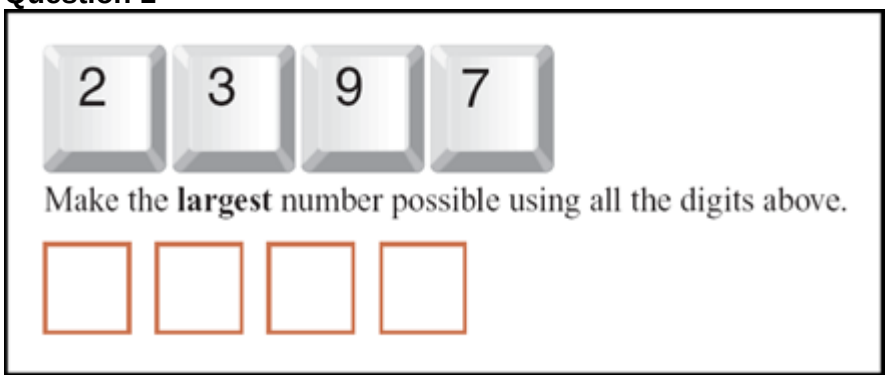
- Dice rolls p. 56
- Correct order p. 78

- Three-digit numbers p. 57
- 800 game p. 58
- Skip counting p. 78
- Biggest number p. 79

Numeracy online resources:

- Year 4–5 Number: Understand whole and decimal numbers
  Learning sequence 4
  Learning sequence 6

Question 1



Skill: Students compare four-digit numbers to choose the largest.
Answer key: 9732

Additional questions

1. Using the four cards, what is the smallest number you can make? How do you know?
2. Write all the different numbers that you could make using these four digits (there are 24).
3. Replace the seven tile with a zero. What would be the largest number you can make?

Question 2

Select **all** the numbers less than 1988.

- ○ 1 899
- ○ 1 990
- ○ 1 918
- ○ 2 009

Skill: Students read and compare four-digit numbers.
Answer key: 1899 and 1918

Additional questions

1. Which part of the numbers would you compare first? Why?
2. What if you just looked at the last two digits in 19**88**? What could go wrong?
3. Which were the easiest numbers to compare? Which were hardest? Why?

Question 3

Which number is 5 less than 280 603?

- ○ 280 103
- ○ 280 598
- ○ 280 608
- ○ 280 653

Skill: Students recognise and use the units, tens and hundreds places in six-digit numbers.
Answer key: B

Additional questions

1. How did you know which number to choose?
2. Which number is 500 less than 280 603? How do you know?
3. Read each number. Which part is the same in every number?
4. What number would be five less than 280 003? Why did the '280' change this time?
5. What number would be 1 000 less than 280 603? Why did 603 now stay the same?

Question 4

Which whole number is closest to 27 199?

- ○ 27 919
- ○ 26 999
- ○ 27 991
- ○ 27 109

Skill: Students compare numbers to tens of thousands.
Answer key: D

Additional questions

1. How did you work out your answer?
2. Why couldn't the answer be 27 919 or 27 991?
3. Which of the numbers is closest to 27 000? How do you know?
4. Ann wrote these numbers: **271 190** **269 990** **271 910** **271 090**
   Ann said that the number 269 990 is closest to 270 090. Is she right?
   How do you know? Work out the difference between each of the four numbers and 270 090.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal numbers :
  - Key understanding 4: The whole numbers are in a particular order and there are patterns in the way we say them which helps us to remember the order.
  - Key understanding 5: There are patterns in the way we write whole numbers that helps us to remember their order.
  - Key understanding 8: We can compare and order the numbers themselves.

Student worksheet

Focus

Reading and comparing whole numbers up to hundreds of thousands

Question 1

Make the **largest** number possible using all the digits above.

Question 2

Select **all** the numbers less than 1988.

- ○ 1 899
- ○ 1 990
- ○ 1 918
- ○ 2 009

Question 3

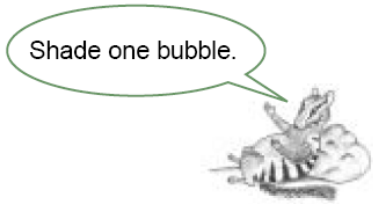
Which number is 5 less than 280 603?

- ○ 280 103
- ○ 280 598
- ○ 280 608
- ○ 280 653

Question 4

Which whole number is closest to 27 199?

- ○ 27 919
- ○ 26 999
- ○ 27 991
- ○ 27 109



Revised October 2016

Recognising different partitions of numbers beyond 100

Background information/teaching focus

We organise or group collections in various ways to make it easier to know how many there are. Grouping based on tens is the standard way to do this because we have chosen to build groupings of ten into the way we write numbers. This grouping makes it easier to count forwards and backwards in tens, hundreds etc from any given number and thus aids calculation.

An understanding of place value allows students to partition numbers into parts in standard and non-standard ways. An understanding of place value should be developed in conjunction with calculation allowing students to apply the patterns in the way we write, say and group numbers. This allows students to apply their knowledge of place value to flexibly partition large numbers to perform computations and solve problems.

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal number
  - Key understanding 6: Place value helps us to think of the same whole number in different ways and this can be useful p.60.
  - Key understanding 7: We can extend the patterns in the way we write whole numbers to write decimals. p.68

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Western Australian Curriculum

- Year 4 – Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems (ACMNA073).
- Year 5 – Use efficient mental and written strategies and apply appropriate digital technologies to solve problems (ACMNA291).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Students understanding of the patterns in the numeration system should continue to be re-enforced. Knowing and understanding that numbers are named according to their value (ie 34 269 represents 34 thousand…) should be developed. Students should develop the idea that the way we write numbers tells us the quantity they represent and this makes it easy to partition numbers and to count forwards and backwards in tens, hundreds etc from any number.
- Read, write and say large numbers and represent these with bundled materials and grid paper.
- Pairs of students take turns to roll two dice, one a standard dice (vary with 8, 10 or larger dice) and the other labelled with ones (3 sides), tens (2 sides) and hundreds (1 side). Students record their dice totals, (eg 4 tens, 5 ones) and try to reach a target number such as 2000.

- Use expanded notation in standard format with mixed place value order or in non – standard formats (ie 20 + 100 + 6 = or 500 + 7 + 80 + 3000 = or 30 + 5 + 200 + 80 + 3=).

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Place-value partitioning p. 31
- Counting on p. 64
- Backwards and forwards p. 65
- Breaking up p. 65
- Flexible numbers p. 66
- Adding and subtracting p. 66
- Grid partitions p. 67

Numeracy online resources
Year 4–5 Number: Understand whole and decimal numbers
Learning sequence 3

Question 1

Which one of these numbers has the same value as **5 + 300 + 60**?

A) 536

B) 365

C) 635

D) 1 400

Skill: Students recognise standard place value partitions of three-digit numbers.
Answer key: B

Additional questions

1. Would the answer be different if the question asked what **60 + 5 + 300** meant?
2. Re-write 365 in two different ways as an addition of three numbers.
3. Write the missing numbers in **200 +** ____ **+** ___ if the total is 385.
   How could you work out what to write in the spaces?

Question 2

Write the missing number on the line.

$18 + 707 = 725$
$18 + 717 = 735$
$18 + 727 = 745$
$18 + \_\_\_ = 755$

Skill: Students complete a number sentence involving the addition of ten.
Answer key: 737

Additional questions

1. Did you do any calculations to fill in the missing number? Why?
2. In the totals, why does only the middle digit change?
3. Following the pattern, write the number sentence immediately after **18 + ____ = 795.** How do you know?

Question 3

Vitek had to work out $30 + 200 + 5$

He then had to add ten.

What should his answer be?

- ○ 236
- ○ 245
- ○ 326
- ○ 335

Skill: Students add 10 to a standard partition of a three-digit number.
Answer key: B

Additional questions

1. How did Vitek add the 10?
2. When Vitek added 10 to the 200, he wrote his answer as 300. Would his final answer be different from *B*? Why?
3. What would the answer be if Vitek correctly added 100 instead of 10?
4. What would the answer be if Vitek correctly added 1 000 instead of 10?

Question 4

Which are the same as 10 000?

- ○ 10 000 ones
- ○ 10 hundreds
- ○ 10 thousands
- ○ 100 thousands
- ○ 100 000 tenths
- ○ 100 000 thousandths

Skill: Students recognise a multiplicative representation of 10 000.
Answer key: A, C and E

Note: Draw attention to the question's instructions. There are three correct responses to this question. Highlight the importance of reading the question carefully.

Additional questions

1. Can you explain why 10 000 ones, 10 thousands and 100 000 tenths are all correct ways of expressing 10 000?
2. What are some other ways of expressing 10 000?
3. What would you multiply a number by to find out how many *tens* there are in that number? Explain why it works?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal numbers
  - Key understanding 2: We often see how many are in a collection just by looking and also by thinking of it in parts. p.24
  - Key understanding 6: Place value helps us to think of the same whole number in different ways and this can be useful. p.60

Student worksheet

Focus

Recognising different partitions of numbers beyond 100

Question 1

Which one of these numbers has the same value as **5 + 300 + 60**?

A) 536

B) 365

C) 635

D) 1 400

Question 2

Write the missing number on the line.

18 + 707 = 725
18 + 717 = 735
18 + 727 = 745
18 + ___ = 755

Question 3

Vitek had to work out 30 + 200 + 5

He then had to add ten.

What should his answer be?

- ○ 236
- ○ 245
- ○ 326
- ○ 335

Question 4

Which are the same as 10 000?

- ○ 10 000 ones
- ○ 10 hundreds
- ○ 10 thousands
- ○ 100 thousands
- ○ 100 000 tenths
- ○ 100 000 thousandths

Calculating addition and subtraction

Background information/teaching focus

Partitioning into part-part-whole is the basis of students' understanding of the meaning of addition and subtraction. Students should develop the idea that they can partition collections and objects into part-part whole without changing the total quantity, and that they can often do this in different ways. They should experiment by moving quantities from one part into to the other to discover that:

- the quantity does not change when the objects are rearranged
- there are patterns linking pairs of numbers.

Thus they should learn to think flexibly of numbers as the sum and difference of other numbers.

Through understanding part-part-whole relationship in quantities, students can begin to apply their understanding to more abstract situations. They begin to understand why subtraction can be used to solve a take away problem and also a comparison problem. Understanding part-part-whole relationships to represent problems in different ways enhances students' flexibility, enabling them to represent problems in different ways so they can choose the most helpful. The part-part-whole relationship is also the key to students seeing why addition is commutative and why subtraction is not.

Students should first resort to mental strategies when calculation is required. Mental methods are usually different from written methods. Students rarely improve their mental computation skills from practising written computation. Formal written methods require application of set procedures to ensure accuracy. Mental methods require a higher level of number sense based on a strong grasp of place value and the relationship between operations.

When they have a developed a range of mental strategies, they should be encouraged to:

- identify appropriate strategies to solve calculations
- apply these strategies to solve calculations
- explain how they applied the strategy to solve the calculation
- justify the reasoning for applying that strategy.

For further related information see *First steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties p. 20.
- Chapter 4: Calculate
  - Key understanding 2: We can think of a number as a sum or difference in different ways. We can rearrange the parts of an addition without changing the quantity p. 106.
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head p. 132.
  - Background information: Techniques for mental calculation p. 194.

Western Australian Curriculum

- Year 3 – Recognise and explain the connection between addition and subtraction (ACMNA054).
- Year 4 – Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems (ACMNA073).
- Year 5 – Use efficient mental and written strategies and apply appropriate digital technologies to solve problems (ACMNA291).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Part-part-whole relationships: Students experiencing difficulty with understanding the part-part-whole relationship should be supported to manipulate numbers and explore the inverse relationship between addition and subtraction using materials such as Cuisenaire rods and joining cubes. Use the part-part-whole diagram (see Chapter 3 Understand Operations, Key understanding 2 of *First Steps in Mathematics: Number* [book two]) to record the whole and its part quantities. The diagram can also be used to organise the information in problems involving larger numbers.
- Provide students with as many opportunities as possible to explain their calculation methods to others and to examine the methods used by others. Activities such as a *How did you do it*? are useful for this. Write a number sentence on the board and then ask different students to explain how they solved it.
- Open questions*:* Provide open questions for students to solve. Encourage them to discuss and justify their reasoning. Questions could include:
  - Think of some different ways to add seven to 21 in your head. How many ways can you do it?
  - I subtracted an odd number from an even number and got the answer of 41. What might the odd and even numbers be?
  - Work out what the missing numbers might be for 2☐ + 3☐ = ☐0
    Extend this problem to combinations adding to numbers into the hundreds. Encourage students to articulate their use of compatible numbers.
  - Work out all possible answers for this addition 2☐6 + ☐8 = ☐2 ☐

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning sequence 1
  Learning sequence 2

The following activities are from *First Steps in Mathematics: Number* (book two):

- Related addition p. 24
- Number relationships p. 24
- Classifying problems p. 25
- Inverse relationships p. 26
- Focus on operations p. 27
- Compensation p. 137
- How did you do it? p. 138
- Compatible numbers (1) p. 139

Question 1

589 + 267 = _____

Skill: Students find the sum of two three-digit numbers.
Answer key: 856

Additional questions

1. How did you add the numbers?
2. What if the numbers were 599 + 277? Would the calculation be more difficult? Why? Why not?
3. For the question above Jane wrote: 589 + 1 + 266. Why did she split the 267?
4. Show how you would split (partition) the numbers to make calculating easier.
5. How would you partition both 18 and 17 to make calculating easier?

Question 2

There are 5250 grand final tickets for sale.
1824 tickets have already been sold.
How many more tickets need to be sold?

4426	3425	3526	3426
⬭	⬭	⬭	⬭

Skill: Students solve word problems involving subtractive situations
Answer key: D

Additional questions

1. How did you solve this problem?
2. Can you write a number sentence(s) to show what you did?
3. What would you put into a calculator to get an answer?
4. Tell me another strategy could you use to solve this problem?
5. What if there were 5260 tickets and 1844 were sold? Tell me how you would work it out this time?

Question 3

347 + 59 = ?

416	496	406	460
⬭	⬭	⬭	⬭

Skill: Students use addition to find a missing value.
Answer key: C

Additional questions

1. How could you work the problem out using a mental strategy?
2. Show me a written strategy to find the missing number.
3. Liam answered 416. This answer is incorrect. Why do you think he may have got this answer?

Question 4

Ryan has $1347 saved and his sister Megan has saved $429.
If the computer they are saving for costs $3200 how much more do they need to save?

_____

Skill: Students use addition and subtraction to solve a two-step problem.
Answer key: $1424

Additional questions

1. How did you solve this problem? Write a number sentence to show what you did.
2. Explain how you could you have solved the problem a different way.
3. What would you put into a calculator to find the answer?
4. How many steps are involved in solving this problem?
5. Can you make up your own 2 step word problem? Write it down and work out the answer. Ask a friend to solve it.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties. p.20
- Chapter 4: Calculate
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head. p.132

Student worksheet

Focus

Calculating addition and subtraction

Question 1

589 + 267 = _____

Question 2

There are 5250 grand final tickets for sale.
1824 tickets have already been sold.
How many more tickets need to be sold?

4426 ⬭ 3425 ⬭ 3526 ⬭ 3426 ⬭

Question 3

347 + 59 = ?

416 ⬭ 496 ⬭ 406 ⬭ 460 ⬭

Question 4

Ryan has $1347 saved and his sister Megan has saved $429. If the computer they are saving for costs $3200 how much more do they need to save?

_____

Revised October 2016

Factors and multiples of two-digit numbers

Background information/teaching focus

If a collection can be shared into equal collections, then we say that the number of equal collections and the number in the equal collections are each **factors** of the number in the original collection. For example, 14 items can be shared into 14 collections of one item and one collection of 14 items, and into seven collections of two items and two collections of seven items. So we say that 14, 7, 2 and 1 are all factors of 14. 14 cannot be shared into collections of 3, so we say 3 is not a factor of 14. Another name for factor is divisor.

A closely related concept is that of **multiples**. A collection of 12 items can be thought of as a unit that is replicated to produce 12 items, 24 items, 36 items, 48 items, and so on. The numbers 12, 24, 36, 48... are then called the multiples of 12. Because of the inverse relationship between multiplication and division, we can, in turn, say that 12 is a factor of each of the numbers 12, 24, 36, 48 and so on.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 5 : Repeating equal quantities and partitioning a quantity into equal parts helps us relate multiplication and division and understand their properties.
- Chapter 4: Calculate
  - Key understanding 3: We can think of a number as a multiplication or division in different ways. We can rearrange the factors of a multiplication without changing the quantity.

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Western Australian Curriculum

- Year 4 – Investigate number sequences involving multiples of 3, 4, 6, 7, 8 and 9 (ACMNA074).
- Year 5 – Identify and describe factors and multiples of whole numbers and use them to solve problems (ACMNA098).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Factor Trees: In pairs, students create factor trees of quantities by creating equal groupings. Use materials such as grid paper, pop sticks and counters to investigate.
- What's my number? The teacher chooses a number. Students have 10 questions to ask about the factors of the number. Use a 'hundreds chart' to eliminate possibilities based on the stated factor. Talk with students about which questions were most useful in narrowing the possibilities and the reasons why this was so.
- Factor Buzz: Choose a target number (i.e. 24). Starting with 1, continue counting around the class. When a factor of 24 is reached, the student says "BUZZ". Teacher record factors as a display chart for future reference. Example: 1, BUZZ, BUZZ, BUZZ, 5, BUZZ, 7, BUZZ, 9, 10, 11, BUZZ, 13, 14……

- Dice factors: In pairs students collect two dice of different colours. Nominate one die as the 'tens' and the other as the 'ones'. Roll both dice and use the number displayed on each face to form a two-digit number. Work in pairs to find the factors of the created number. Provide materials such as counters, pop sticks, grid paper and geoboards to assist in identifying the factors.
- Use materials and grid paper arrays to model groupings to help develop the understanding of the relationship between multiplication and division.

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Arrays p. 29
- Working out quantities p. 31
- Flexible numbers p. 66
- Different strategies p. 67

The following activities are from *First steps in Mathematics: Number* (book two):

- Factors p. 255
- Is it a multiple? p. 255

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning sequence 2

- Year 4–5 Number: Understand operations
  Learning sequence 9

Question 1

Maya packed eggs into some cartons.
Each carton holds 12 eggs.
How many eggs could she have started with if there were no eggs left over and all cartons were full?

A) 120
B) 58
C) 36
D) 30

Skill: Choose a multiple of 12 in a practical context.
Answer key: A and C

Additional questions

1. How many eggs would she need to fill five cartons?
2. Maya packed **all** the eggs she has in cartons. She put 6 eggs in each carton. Which of the numbers above cannot be the number of eggs she started with? Lisa said that in the list of four options above there are more **multiples** of six than of 12. Is this correct? How do you know?

Question 2

Suzie has 24 blocks. She arranged them with the same number of blocks in each row.
How many blocks could she have used in each row?

A) 4
B) 5
C) 7
D) 8

Skill: Students select the factors of 24.
Answer key: A and D

Additional questions

1. How did you decide which numbers to choose?
2. What other ways could she have arranged all 24 blocks in equal rows?
3. List all the different ways you could arrange 36 blocks in equal rows.
4. What equal size rows can be made with 36 blocks, but not with 24 blocks? Why?

Question 3

Which of these numbers are multiples of 11?

A) 121
B) 101
C) 71
D) 66

Skill: Students select the multiples of a given number.
Answer key: A and D

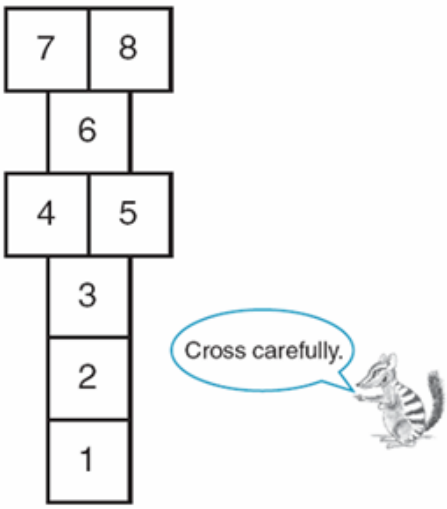
Additional questions

1. Write three other **multiples** of 11.
2. How would you find some **multiples** of any given number?
3. What would you put into your calculator to find out if 101 is a multiple of 11?

Question 4

Evan hopped on all the numbers that are **factors of 16**.

Put a cross (X) on **all** the numbers Evan hopped on.



Skill: Students understand and use the term *factor*.
Answer key: 1, 2, 4, and 8.

Additional questions

1. How did you choose the factors of 16?
2. How could the factors of 16 help you to find the factors of 32?
3. Have students explore factors by using a 100-grid. (They can write a small 2 in the corner of every square that is a multiple of 2, then a small 3 in every square that is a multiple of 3, and so on).

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal numbers
  - Key understanding 2: We can often see how many are in a collection by looking and also by thinking of it in parts. p.24

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 5: Repeating equal quantities and partitioning a quantity into equal parts helps us to relate multiplication and division and understand their properties. p.52
- Chapter 4: Calculate
  - Key understanding 3: We can think of a number as a multiplication or division in different ways. We can rearrange the factors of multiplication without changing the quantity. p.114

Student worksheet

Focus

Factors and multiples of two-digit numbers

Question 1

Maya packed eggs into some cartons.
Each carton holds 12 eggs.
How many eggs could she have started with if there were no eggs left over and all cartons were full?

A) 120
B) 58
C) 36
D) 30

Question 2

Suzie has 24 blocks. She arranged them with the same number of blocks in each row.
How many blocks could she have used in each row?

A) 4
B) 5
C) 7
D) 8

Question 3

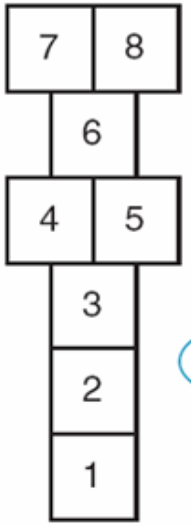
Which of these numbers are multiples of 11?

A) 121
B) 101
C) 71
D) 66

Question 4

Evan hopped on all the numbers that are **factors of 16**.

Put a cross (X) on **all** the numbers Evan hopped on.



Revised October 2016

Multiplying a whole number by one-digit numbers

Background information/teaching focus

Students are usually introduced to multiplication as simply 'repeated addition' however the concept is actually more complex. The notion that 5 x 2 refers to five groups of two requires careful development and students should be supported to think multiplicatively of these situations, since repeated addition does not address all situations in which multiplying is helpful.

Students should learn to recognise a wide range of problem types to which multiplication applies. They need to be helped to see how these apparently different types of problems are related and can all be solved using multiplication. Students who understand the meaning of multiplication can also represent number sentences in materials, drawings or sensible stories. It is important to expose students to the five multiplication problem types to ensure they are able to identify situations when it is appropriate to apply multiplication.

Students should be encouraged to first use mental arithmetic for calculations and to develop an increasing repertoire of mental computation strategies. For an explanation of some useful strategies refer to the background notes on techniques for mental calculation below.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 3: Multiplying numbers is useful when we:
    - repeat equal quantities
    - use rates
    - make ratio comparisons or changes
    - make arrays and combinations
    - need products of measure p.28
  - Background notes: Multiplication and division problems p. 90.
- Chapter 4: Calculate
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head p. 132.
  - Background notes: Techniques for mental calculation p. 194.

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Western Australian Curriculum

- Year 4 – Solve word problems by using number sentences involving multiplication or division where there is no remainder (ACMNA082).
- Year 5 – Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies (ACMNA100).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Placemat – Divide a large piece of paper into four with a box drawn in the centre. Provide each group with a range of multiplication problems which include the different multiplication problem types. Students work on the problem. After five minutes, stop the students and get them to explain in their groups how they solved the problem. Discuss the strategies the different strategies. Were they easier? Could they apply some different strategies in the future?
- Open questions – provide open multiplication questions for students to solve. Questions could include:
  - Using the digits 9, 8, 7 set out like □□ x □ = how many different answers can you find? Vary the activity with different number combinations to solve or change the number of boxes and size of numbers.

For further activity ideas see *First Steps in Mathematics: Number* (book two):

- Equal groups p. 32
- Multiplication p. 33
- Soup for everyone p. 33
- Prisms p. 118
- Sample lesson 2 *How did you do it?* p.142
- Using factors p. 119
- Factor bingo p. 120
- Multiply the parts p. 137

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning sequence 2

Question 1

$80 \times 6 =$ _____

Skill: Students use known facts to multiply efficiently.
Answer key: 480

Additional questions

1. What is 8 lots of 6 ? How does knowing this help you work out 80 x 6?
2. How does knowing that 8 x 10 = 80 help?
3. What other ways could you work this out? How could doubling help?
4. Why does multiplying 8 x 6 and then multiplying the answer by 10 give the same result as entering 80 x 6 in your calculator?

Question 2

Yo biscuits come in packets of 24.

Walter has 6 packets.

How many *Yo* biscuits does he have?

- ○ 4
- ○ 30
- ○ 120
- ○ 144

Skill: Students multiply by a one-digit number in familiar context.
Answer key: D

Additional questions

1. Which operation would you use to solve the problem? Why?
2. Helen used addition to solve the problem above.
   What numbers could she have added?
3. Len has two more packets than Walter.
   How many biscuits does Len have?
4. How could doubling help you work out the answer? If you doubled 24 to make 48, what would you need to multiply it by? How could you make sense of this? (*If packets were double in size – 48 in a packet – to get the same number of biscuits, you would only need half the number of packets. So 6 x 24 = 3 x 48)*

Question 3

Write one digit in each shape to make this correct.

$$\begin{array}{r} 5\ 3\ 2 \\ \times \quad \square \\ \hline 4\ \triangle\ 5\ 6 \end{array}$$

Students select the multiples of a given number.
Answer key: 532 × **<u>8</u>** = 4 **<u>2</u>**56

Additional questions

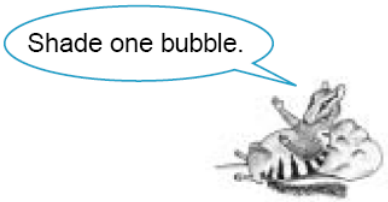
1. How do you know the result must be more than 4000?
2. What could the digit in the square be? What are the two options?
3. Glen calculated correctly **532 × 3.** What is the difference between his result and the correct result? How many 'lots of 532' is the difference?
   (532 x 3) + (532 x 5) = (532 x 8)

Question 4

Sixteen people are watching the football grand final. They want to order pizzas that are cut like this.

Each person will eat three slices.

How many pizzas will they need to order?



- ○ 4
- ○ 6
- ○ 8
- ○ 12

Skill: Students use multiplication in a familiar context.
Answer key: B

Additional questions

1. How many people could share one pizza? How many pieces are left over from one pizza? How can knowing this help you solve the problem?
2. Two more people joined the party. There are now 18 people at the party. How many pizzas need to be ordered if everyone gets three slices? Are there any pieces left over?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 3: Multiplying numbers is useful when we:
    - repeat equal quantities
    - use rates
    - make ratio comparisons or changes, eg scales
    - make arrays and combinations
    - need products of measure.

- Chapter 4: Calculate
  - Key understanding 3: We can think of a number as a multiplication or division in different ways. We can rearrange the factors of multiplication without changing the quantity.
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head.

Student worksheet

Focus

Multiplying a whole number by one-digit numbers

Question 1

$80 \times 6 =$ _____

Question 2

Yo biscuits come in packets of 24.

Walter has 6 packets.

How many *Yo* biscuits does he have?

- ○ 4
- ○ 30
- ○ 120
- ○ 144

Question 3

Write one digit in each shape to make this correct.

$$\begin{array}{r} 5\ 3\ 2 \\ \times \quad \square \\ \hline 4\ \triangle\ 5\ 6 \end{array}$$

Write one digit in each shape.

Question 4

Sixteen people are watching the football grand final. They want to order pizzas that are cut like this.

Each person will eat three slices.

How many pizzas will they need to order?

- ○ 4
- ○ 6
- ○ 8
- ○ 12

Shade one bubble.

Dividing a whole number by one-digit numbers

Background information/teaching focus

Students should learn to recognise a wide range of problem types to which division applies. Students should learn that the division operation is appropriate for:

- Problems where you know the quantity and the number of portions to be formed from it, and you want to find out how many will be in each portion eg I shared 18cm of licorice equally between 3 people. How much did I give each person? These are called **partition** problems (or informally called sharing problems)
- Problems where you know the quantity and how many is to be in each portion, and you want to find out how many portions there will be eg I had 18cm of licorice and I gave each person 3cm. How many people could get licorice? These are called **quotient** problems (or informally grouping, measuring or repeated subtraction problems)

Students should be encouraged to associate division with sharing and grouping. There are division problems associated with rates, ratio comparisons or changes, arrays and combinations and products of measure. The inverse relationship between division and multiplication should be fostered through experiences with these different problems types.

Students should be encouraged to see mental arithmetic as the first resort when they need to calculate. Students should develop an increasing repertoire of mental strategies to assist in calculating division. For an explanation of some useful strategies refer to the background notes on techniques for mental calculation below.

Students should be encouraged to develop personal mental strategies, to experiment with and compare strategies used by others, and to choose strategies to suit their own strengths and the situation. This requires a high level of number sense based on a strong grasp of place value and the relationships between operations.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication p.40
- Chapter 4: Calculate
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head p. 132.
  - Background notes: Techniques for mental calculation p. 194.

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Western Australian Curriculum

- Year 4 – Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder (ACMNA076).
- Year 4 – Solve word problems by using number sentences involving multiplication or division where there is no remainder (ACMNA082).
- Year 5 – Solve problems involving division by a one digit number, including those that result in a remainder (ACMNA101).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Students should be encouraged to demonstrate their understanding of division by representing number sentences in materials, drawings or sensible stories.
- Provide students with ample opportunity to explain their calculation strategies and to examine the strategies used by others.
- Division Placemat: Divide a large piece of paper into 4 with a central box. Provide each group with a range of division problems reflecting a range of the different division problem types. Students are to work to solve the problem. After 5 minutes, all students are to stop and in their groups explain how they solved the problem. After the session, students are to reflect on strategies that others applied that were different to theirs. Were the other strategies easier? Could they apply some different strategies in the future?

For further activity ideas see *First Steps in Mathematics: Number* (book two):

- Changing quantities p. 45
- Different views p. 45
- Sharing or grouping p. 46
- Bundling materials p. 127
- Sample lesson 2: How did you do it? p. 142
- Division number sentences p. 129
- What is the question? p. 136
- Wipe out p. 137

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning Sequence 2

Question 1

Six friends went out to dinner.
The bill totalled $126.
They shared the total cost equally.

How much did each person pay? $_____

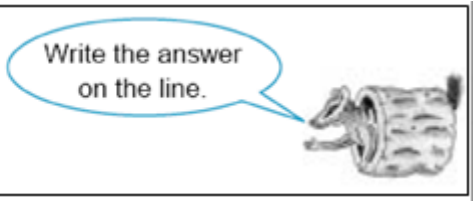
Skill: Students use division to calculate a sharing problem.
Answer key: 21

Additional questions

1. What operation would you use to solve this problem?
2. George halved each number first. Would he still get the same answer? Why would that work?
3. Think of $126 as $120 + $6. Share this amount equally between 6 people. How would splitting the amount first make it easier to calculate the answer? Draw this on grid paper to prove that it works.

Question 2

385 ÷ 7 = _____



Skill: Students divide a three-digit number by 7.
Answer key: 55

Additional questions

1. How did you do the division?
2. Did you think of it as 385 shared between 7, or, how many 7s are there in 385? Which is easier? Why?
3. How can you partition 385 to make it easier to work out?
4. If we write **385** as **350 + 35**, will this make it easier to calculate? Draw this on grid paper to prove that it works.

Question 3

What is the greatest number of 8 cm pieces that can be cut from 200 cm of string?

- ○ 20
- ○ 25
- ○ 192
- ○ 208

Skill: Students use division to solve a problem in a familiar context.
Answer key: B

Additional questions

1. How did you work this out?
2. Would halving each number work for this problem? Why would it work?
3. How could you check that your answer is correct?
4. There is not enough string to cut 30 pieces. Why not?
5. After you cut 20 pieces there is 40 cm of the string left.
   How many 8-cm pieces can you cut from 40 cm? How would you write down your calculations?

Question 4

Write the missing digit in the box.

4	x		2	=	2	0	8

Skill: Students divide a three-digit number by 4.
Answer key: 5

Additional questions

1. How did you work it out?
2. Jane wrote 208 = 200 + 8.
   Will this help her to get the answer more easily? Why?
3. Andrew wrote 4 x ____ = 104. *(He halved one multiplier and the result.)*
   How does this help him work out the answer?
4. Write another way to work out the answer. Which way do you think is the best? Why?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication. p.40
- Chapter 4: Calculate
  - Key understanding 4: Place value and basic number facts together allow us to calculate with any whole or decimal numbers. p.122
  - Key understanding 5: There are strategies we can practise to help us do calculations in our head. p.132

Student worksheet

Focus

Dividing a whole number by one-digit numbers

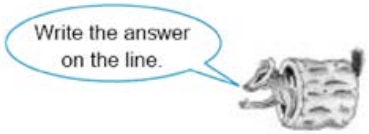
Question 1

Six friends went out to dinner.
The bill totalled $126.
They shared the total cost equally.

How much did each person pay? $_____

Question 2

385 ÷ 7 = _____



Question 3

What is the greatest number of 8 cm pieces that can be cut from 200 cm of string?

- ○ 20
- ○ 25
- ○ 192
- ○ 208

Question 4

Write the missing digit in the box.

4	x		2	=	2	0	8

Revised October 2016

Locating whole numbers, common fractions and decimals on a number line

Background information/teaching focus

It is important that students develop an understanding of the structure and relationships involved when place value is extended to represent decimal numbers. Students should be engaged in learning experiences that foster the following concepts and ideas:

- There are numbers between consecutive whole numbers
- The place-value system can be extended to the right of the units place to show numbers between two whole numbers
- To represent a number between two consecutive whole numbers, record the whole, followed by the part, separated by a decimal point, eg a number between 4 and 5 is 4.6

Students should learn to think of all numbers, including decimals and fractions as positions on a number line and use a range of calibrated scales. They should begin initially with the idea of moving backwards and forwards along the number line in conjunction with counting. Later, the relative order and size of numbers, decimals and fractions should be the focus. Fractions can be used to describe quantities but they also represent numbers that have their own properties and their own position on a number line. Fractions can be compared and ordered, like whole and decimal numbers. Students should develop a repertoire of strategies for comparing and ordering fractions such as:

- Comparing fractions to a 'benchmark' number (often $\frac{1}{2}$ or 1); for example, $\frac{1}{3}$ is smaller than a half.
- Thinking about the distance from 1; for example, $\frac{7}{8}$ is closer to 1 than $\frac{4}{5}$. Therefore $\frac{7}{8}$ is bigger than $\frac{4}{5}$.
- Find each as a fraction of a suitable number and compare how many you get; for example, to compare $\frac{4}{7}$ and $\frac{3}{5}$, think of a number both denominators 'go into' (35). $\frac{4}{7}$ of 35 is 20 and $\frac{3}{5}$ of 35 is 21, so $\frac{3}{5}$ is more.

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal number
  - Key understanding 7: We can extend the patterns in the way we write whole numbers to write decimals p. 68.
  - Key understanding 8: We can compare and order the numbers themselves p. 74.
- Chapter 4: Understand fractional numbers
  - Key understanding 5: We can compare and order fractional numbers and place them on a number line p. 134.

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Western Australian Curriculum

- Year 4 – Recognise, represent and order numbers to at least tens of thousands (ACMNA072).
- Year 4 – Count by quarters halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line (ACMNA078).
- Year 5 – Compare and order common unit fractions and locate and represent them on a number line (ACMNA102).
- Year 5 – Compare, order and represent decimals (ACMNA105).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Connect decimals and fractions to real life scenarios such as quantities used in shopping and cooking and measurement.
- Use calibrated number lines to plot and compare fraction and decimal numbers.
- Give each student a number on a card and have them place themselves on a number line. Repeat using decimals and fractional numbers ensuring that some of these are greater than one.

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Flexible numbers p. 66
- Peg up p. 78
- Estimating p. 78
- Number scrolls p. 78
- Decimal number line p. 80
- Calibrated scales p. 80
- Fraction tapes p. 137
- What number am I? p. 137
- Estimating positions p. 138
- Fraction number line p. 138
- Ordering and comparing fractions p. 139
- Fraction cards p. 139

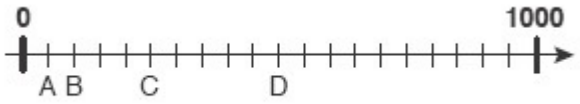
Numeracy online resources

- Year 4–5 Number: Understand whole and decimal numbers
  Learning sequence 6

- Year 4–5 Number: Understanding fractions
  Learning sequence 4

Question 1

Which letter shows where 50 would be on this number line?



- A
- B
- C
- D

Skill: Students show whole numbers on a number line.
Answer key: A

Additional questions

1. How did you work out where 50 is located on the number line?
2. Where would 500 be on the number line? How do you know?
3. What if the 1000 was changed to 500?
4. What would happen if we changed the starting number?

Question 2

Put a cross on the line to show where 30 would be.

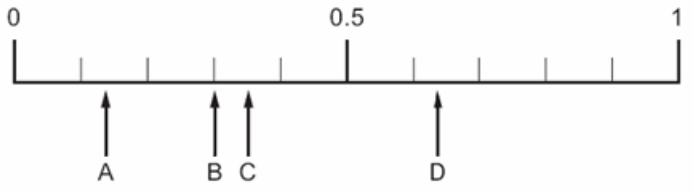
Show the positions of the numbers $\frac{1}{2}$ and $\frac{2}{5}$ on the number line above.

Skill: Students show whole numbers on a number line.
Answer Key: Roughly the distance of 5 tick marks

Additional questions

1. How can you judge where 30 should be?
2. How could the numbers already shown help you?
3. What would be the position of 12.5? How do you know?

Question 3



Which arrow is closest to the number line?

A B C D

Skill: Students show decimals on a number line.
Answer key: C

Additional questions

1. How did you work out where 0.35 is on the number line?
2. What number would be half way between 0.4 and 0.5?
3. Where would one-quarter be on the number line? How do you know?
4. Write the number closest to each of the four arrows.

Question 4

Show the positions of the numbers $\frac{1}{2}$ and $\frac{2}{5}$ on the number line above.

Skill: Students identify positions of fractions on a number line.
Answer key: $\frac{1}{2}$ should be on the middle tick mark and $\frac{2}{5}$ should be on the forth tick mark.

Additional questions

1. Show the position of $\frac{1}{10}$
2. Extend the scale and show the position of 1 + 0.3
3. Use the number line to show the result of $\frac{1}{10} + \frac{1}{2}$

Question 5

Show the positions of the numbers 2.4 and 3 on the number line above.

Skill: Students interpret and use scale to locate positions of decimals on the number line.
Answer key: 2.4 should be on the 6th tick mark and 3 should be halfway between the 7th and 8th tick marks.

Additional questions

1. How much does each mark on the number line represent? (0.4)
2. Count by 0.4 to label each mark on the number line. Use a ruler to extend the line and continue.

Curriculum references

Department of Education and Training Western Australia 2004, First Steps in Mathematics: Number (book one):

- Chapter 3: Understand whole and decimal numbers
  - Key understanding 7: We can extend the patterns in the way we write whole numbers to write decimals. p.68
  - Key understanding 8: We can compare and order the numbers themselves. p.74

- Chapter 4: Understand fractional numbers
  - Key understanding 5: We can compare and order fractional numbers and place them on a number line.
  - Key understanding 6: A fractional number can be written as a division or as a decimal.

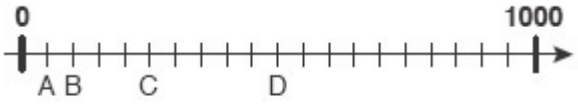
Student worksheet

Focus

Locating whole numbers, common fractions and decimals on a number line

Question 1

Which letter shows where 50 would be on this number line?



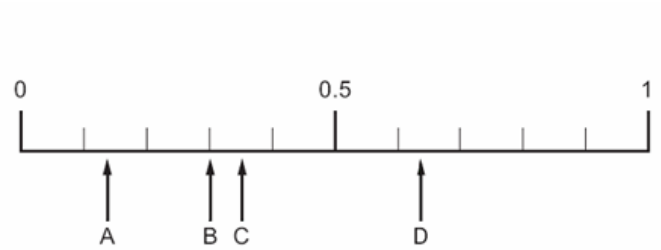
- A
- B
- C
- D

Question 2

Put a cross on the line to show where 30 would be.

Show the positions of the numbers $\frac{1}{2}$ and $\frac{2}{5}$ on the number line above.

Question 3



Which arrow is closest to the number line?

A B C D

Question 4

Show the positions of the numbers $\frac{1}{2}$ and $\frac{2}{5}$ on the number line above.

Revised October 2016

Question 5
 Show the positions of the numbers 2.4 and 3 on the number line above.

Representing and calculating unit fractions

Background information/teaching focus

The idea that things can be partitioned or split into parts of equal size underpins the fraction concept, eg sharing a pizza equally between six people means they will all have one-sixth of it. Students require extensive experience in splitting a diverse range of discrete and continuous wholes into equal-sized parts. They should become flexible in partitioning and develop the following ideas:

- Equal parts need not look alike, but they must have the same size or amount of the relevant quantity.
- When splitting a whole into equal parts, the whole should be completely used up.
- Regardless of how we partition, the whole remains the same amount.
- The more shares something is split into, the smaller each share will be.

It is important to re-enforce the reality that the same fractional parts of different numbers look different, but importantly they are still equal in size. The principle of equality is important to groups being identified as 'fractional parts' of a portion. A good grasp of the vocabulary and notation of fractions should be developed, focusing on the meaning of fractions.

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 4: Understand fractional numbers
  - Key understanding 2: We can partition objects and collections in two or more equal-sized parts and the partitioning can be done in different ways p. 104
  - Key understanding 3: We use fractions, words and symbols to describe parts of a whole. The whole can be an object, a collection or a quantity p. 116

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Western Australian Curriculum

- Year 3 – Model and represent unit fractions including $\frac{1}{2}, \frac{1}{4}, \frac{1}{3}, \frac{1}{5}$ and their multiples to a complete whole (ACMNA058).
- Year 4 - Count by quarters halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line (ACMNA078).
- Year 5 – Compare and order common unit fractions and locate and represent them on a number line (ACMNA102).
- Year 6 - Compare fractions with related denominators and locate and represent them on a number line (ACMNA125).
- Year 6 - Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies (ACMNA127).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Use materials such as counters, buttons or pop sticks to create different fractional amounts by physically distributing equally into parts. For example, distribute 12 objects into thirds, quarters, halves and record the different quantities represented in the fractional amounts.
- Give students a variety of materials to find a unit fraction, eg one-third, one-fifth. Include quantities of discrete materials that are the same as the denominator, less than the denominator, a multiple of the denominator and more than the denominator, but not a multiple. Also include materials that require folding, pouring and cutting to partition such as triangles, play dough, string, rice or water.
- Use think boards to represent different fractional amounts in context.

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Sharing collections p.106
- Party baskets p. 107
- Sharing a pizza p. 108
- See sample lesson 2 – Pets p. 113
- Equal portions p. 108
- Equal groupings p. 108
- Sharing large collections p. 109

Numeracy online resources

- Year 4–5 Number: Understanding fractions
  Learning sequence 1

Question 1

About what fraction of the large square is shaded grey?

$\frac{1}{3}$ $\frac{1}{9}$ $\frac{2}{3}$ $\frac{8}{9}$

Skill: Students find the fraction of a whole.

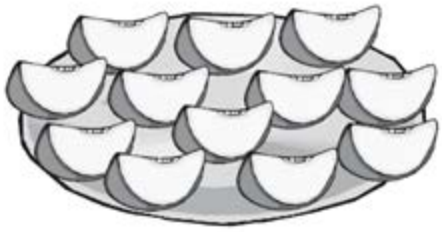
Answer key: $\frac{8}{9}$

Additional questions

1. The square is in two parts. Is the square divided into halves? Why? Why not?
2. How can you decide how many equal parts the square can be divided into?
3. About what fraction of the large square is white?

Question 2

Kate cut some apples into quarters.



How many apples did she start with?

2 3 4 6 12

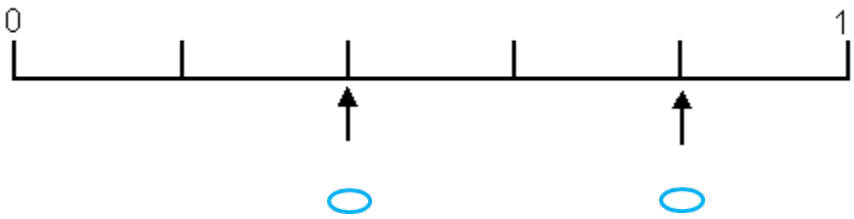
Skill: Students convert quarters to wholes from a visual representation.
Answer key: B

Additional questions

1. How do you know how many whole apples have been cut?
2. If there are 18 quarter apples, how many whole apples can you make? How much of an apple would be left over?
3. How many quarters would there be if you cut 10 apples into quarters?
4. How many half apples would there be if you had 24 quarter apples? How do you know?

Question 3

Where would eight tenths be on this number line?



Skill: Students find an equivalent fraction on a number line.
Answer key: Arrow nearest to the 1

Additional questions

1. What fraction does each section of the number line represent? How do you know?
2. How did you work out where eight tenths is?
3. How many fifths is four tenths? How do you know?

Question 4

$\frac{2}{8}$ = ☐☐

What represents one whole?

- ○ ☐☐☐☐☐
- ○ ☐☐☐☐☐☐
- ○ ☐☐☐☐☐☐☐
- ○ ☐☐☐☐☐☐☐☐

Skill: Identifies a whole if shown a fractional representation.
Answer key: D

Additional questions

1. How did you decide on the answer?
2. What fraction does one square represent?
3. If 2 squares equalled one eighth how many squares would equal one whole? Explain your answer.

Question 5

There were 15 920 people at a cricket match. One fifth of the crowd supported the visiting team. Which number of these is closest to the number of people who supported the visiting team?

○	2000
○	200
○	3000
○	300

Skill: Estimates one fifth of a 5 digit number.
Answer key: C

Additional questions:

1. Explain how you chose your answer.
2. How could you check your answer? What would you enter into a calculator to work it out?
3. If the number of people at the cricket match was 115 920 would it be harder to work out one fifth? Why/Why not?
4. Create your own word problem involving quarters. Find out the answer. Give it to a friend to solve.

Question 6

$$\frac{1}{2} + \frac{1}{4} + \frac{3}{8} =$$

$1\frac{1}{2}$	$1\frac{3}{8}$	$2\frac{1}{4}$	$1\frac{1}{8}$
○	○	○	○

Skill: Calculates fractions with different denominators.
Answer key: D

Additional questions:

1. Explain how you worked out the answer.
2. Draw a diagram to show your working out.
3. How could you check your answer so that you know it is correct?
4. Could you add sevenths to thirds and fifths? Why/Why not?
5. Create your own number sentence fractions with different denominators and mixed fractions. Find the answer. Ask a friend to find the missing value.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 4: Understand fractional numbers
  - Key understanding 2: We can partition objects and collections into two or more equal-sized parts and the partitioning can be done in different ways. p.100
  - Key understanding 3: We can use fraction words and symbols to describe parts of a whole. The whole can be an object, a collection or a quantity. p.112

Student worksheet

Focus: Representing unit fractions

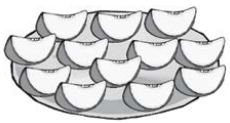
Question 1

About what fraction of the large square is shaded grey?

$\frac{1}{3}$ $\frac{1}{9}$ $\frac{2}{3}$ $\frac{8}{9}$

Question 2

Kate cut some apples into quarters.

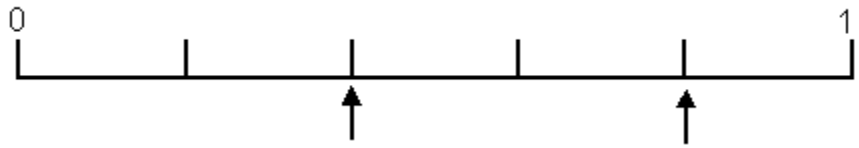


How many apples did she start with?

2 3 4 6 12

Question 3

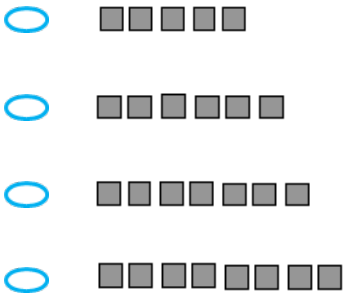
Where would eight tenths be on this number line?



Question 4

$\frac{2}{8}$ = ■■

What represents one whole?



Question 5		Question 6
There were 15 920 people at a cricket match. One fifth of the crowd supported the visiting team. Which number of these is closest to the number of people who supported the visiting team?		$\frac{1}{2} + \frac{1}{4} + \frac{3}{8} =$
○	2000	$1\frac{1}{2}$ ○
○	200	$1\frac{3}{8}$ ○
○	3000	$2\frac{1}{4}$ ○
○	300	$1\frac{1}{8}$ ○

Representing and calculating key percentages

Background information/teaching focus

Percentages are used to describe a ratio between two quantities where the 'fraction' has been written with the common denominator of 100. This makes comparisons easy. For example, if I got 12 out of 20 correct in an addition test in Week 1 and 15 out of 25 correct in an addition test in Week 2, have I improved? Converting the scores to a percentage will show that I performed equally as well each week.

Percentages can be applied to a number of situations in every day life and students should be exposed to these contexts. Examples may include:

- I have 12 apples and I gave away 50%, how many did I give away?
- I had 10 shots at a soccer goal and I scored on 3, what percentage did I score?
- A television costs $400 and a sale advertised 25% off the price. How much does the television cost?

For further related information see *First Steps in Mathematics: Number* (book one):

- Chapter 4: Understand fractional numbers
  - Key understanding 7: A fraction symbol may show a ratio relationship between two quantities. Percentages are a special kind of ratio we use to make comparisons easier.

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Western Australian Curriculum

- Year 6 – Make connections between equivalent fractions, decimals and percentages (ACMNA131).
- Year 6 – Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies (ACMNA132).

Learning experiences and activities

- Percentage investigations: Students are given a quantity of items (i.e. 20 items). In pairs, investigate 25%, 50% and 75%. Extend the quantity amounts and the percentage values.
- Discount: Collect a range of advertisements for sales offering a discount. Calculate the discounted price of the items and money saved.
- Card games: Play card games such as 'concentration' and 'snap' with a collection of cards showing equivalent fractions, decimals and percentages (i.e. 0.5, 50% and $\frac{1}{2}$). Include visual representations of the quantities.

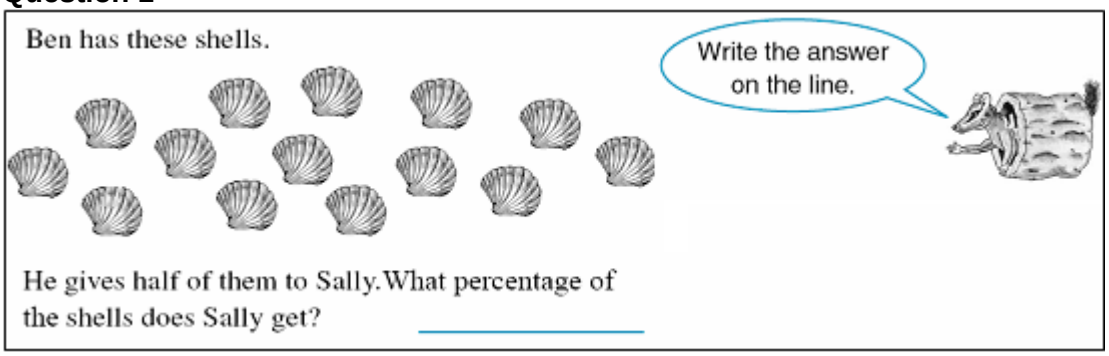
For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Bargain hunting p. 155
- Matching games p. 156
- Hundred square p. 156
- Discounts p. 157
- Percentages p. 159

Numeracy online resources

- Year 6–7 Number: Understand fractional numbers
  Learning sequence 2

Question 1

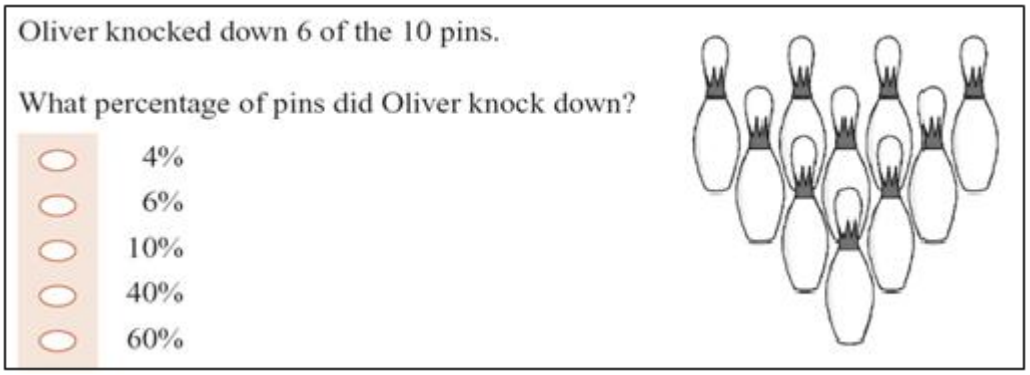


Skill: Students link key fractions and percentages.
Answer key: 50%

Additional questions

1. How many shells did Sally get?
2. Kevin had 20 shells and gave 10 away. What percentage did he give away? How can a different number of shells be equal to the same percentage?
3. Ben has 40 shells. He gives one-quarter of them to Bob.
   What percentage of all shells does Bob get? Does that percentage make sense compared to 50%? Why?

Question 2



Skill: Students recognise a percentage, given a number out of ten.
Answer key: E

Additional questions

1. How did you decide what percentage of the pins had been knocked down?
2. What percentage of the total number of pins remained standing?
3. What percentage of the total number of pins is each pin worth? How do you know?
4. Why is it easy to work out percentages when the number is out of 10?
5. If all of the pins were knocked down what percentage of pins were knocked down?

Question 3

What is the sale price of the phone?

- ○ $25
- ○ $50
- ○ $150
- ○ $175

Original price $200

Sale price 25% off

Skill: Students calculate a 25% reduction on an original price greater than $100.
Answer key: C

Additional questions

1. How did you calculate the percentage discount?
2. What would 50% of the $200 be?
3. How much is1% of the $200?
4. What other strategies could you use to find the discount?

Question 4

The price of the book *Up in Space* is usually $30.
This week the price of the book is 25% less.

How much does the book cost this week?

- ○ $7.50
- ○ $22.50
- ○ $23.50
- ○ $25.00
- ○ $27.50

Shade one bubble.

Skill: Students calculate 25% reduction on an original price less than $100.
Answer key: B

Additional questions

1. How did you work out the new price? Could halving have helped? How?
2. How can halving and re-halving help work out 25% of any amount? What percentage do you find when you halve the amount once? (50%)
3. How much is the cash saving on the book?
4. What percentage of the original price is the discounted cost of the book?

Curriculum reference

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 4: Understand fractional numbers
  - Key understanding 7: A fraction symbol may show a ratio relationship between two quantities. Percentages are a special kind of ratio we use to make comparisons easier. p.148

Student worksheet

Focus

Representing and calculating key percentages

Question 1

Ben has these shells.

Write the answer on the line.

He gives half of them to Sally. What percentage of the shells does Sally get? _____

Question 2

Oliver knocked down 6 of the 10 pins.

What percentage of pins did Oliver knock down?

- ○ 4%
- ○ 6%
- ○ 10%
- ○ 40%
- ○ 60%

Question 3

What is the sale price of the phone?

- ○ $25
- ○ $50
- ○ $150
- ○ $175

Original price $200

Sale price 25% off

Question 4

The price of the book *Up in Space* is usually $30.
This week the price of the book is 25% less.

How much does the book cost this week?

- ○ $7.50
- ○ $22.50
- ○ $23.50
- ○ $25.00
- ○ $27.50

Shade one bubble.

Adding and subtracting decimals in money/measurement contexts

Background information/teaching focus

Students should be supported with money and measurements through the use of concrete materials. For example to solve 1.6m + 2.3m students could make two individual tapes showing each measurement. Each tape could be cut into two parts to show the whole metres and part metres. The whole metres could be combined (i.e. to make 3 metres) and then the part metres are also combined (i.e. making 0.9 metre). It then becomes very clear to the students that they have 3.9m.

Western Australian Curriculum

- Year 4 – Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation (ACMNA079).
- Year 4 – Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies (ACMNA080).
- Year 6 –Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers (ACMNA128).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Writing problems: Students write problems for others to solve using money and measurement contexts. Amounts involving decimals need to be included in the problems.
- Money number lines: Give students a number line with scale marks to represent hundredths (the 'cents') to identify monetary quantities. Students use the number line to solve simple addition and subtraction problems involving money (for example making change, adding amounts from shopping catalogues).
- Measurement problems: Use measurement materials (eg tape measures, rulers) to support students understanding. Students measure and compare their heights. Complete activities and calculations on differences, combining heights to meet set criteria (eg, what three lengths combined is closest to 8 metres?)
- Grid money: Using 2mm grid paper, students represent money amounts where 1 small square equals one cent. Use these representations to combine and work out differences between quantities.

For further activity ideas see *First Steps in Mathematics: Number* (book one):

- Recording measurements p. 73
- Lengths as decimals p. 73

First Steps in Mathematics: Number (book two):

- Addition and subtraction p. 18
- Long jump p. 19
- Part-whole situations p. 19
- Long jump p.26

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning Sequence 5

Question 1

Dave bought one of each of these things

$1.25

$0.90

55c

$1.50

25c

$2.50

How much did he spend altogether?

Skill: Students add and interpret decimals in a money context.
Answer key: $6.95

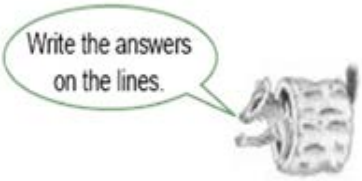
Additional questions

1. Add 55c and $0.90. Explain how you combined the two amounts. How would you need to enter these two amounts in your calculator?
2. The picture shows these two amounts, $1.25 and 25c. How are they the similar? How are they different?
3. Try writing all of the amounts in cents. Try writing them all in dollars.
   How would you add the amounts written in cents?
   How would you add the amounts written in dollars?

Question 2

Sam used a calculator to help him add up the cost of the groceries.

It showed **127.8**



How much does Sam need to pay for the groceries?

_____ dollars and _____ cents

Skill: Students interpret a calculator display of a decimal as dollars and cents.
Answer key: 127 dollars and 80 cents

Additional questions

1. What does the decimal part (**0.8**) of the 127.8 mean?
2. How many dollars and cents would $127.85 mean? $127.08?
3. Add 1.5 **dollars**, 1.25 **dollars** and 1.05 **dollars**. Draw a diagram on grid paper to explain your answer. What is difficult about adding these three amounts?

Question 3

Sally has 3 dollars and 5 cents in her pocket.

Which one of the following shows this amount?

- ○ $3.5
- ○ $3.05
- ○ $3.50
- ○ $35.00

Skill: Students write amounts of money in a decimal form.
Answer key: B

Additional questions

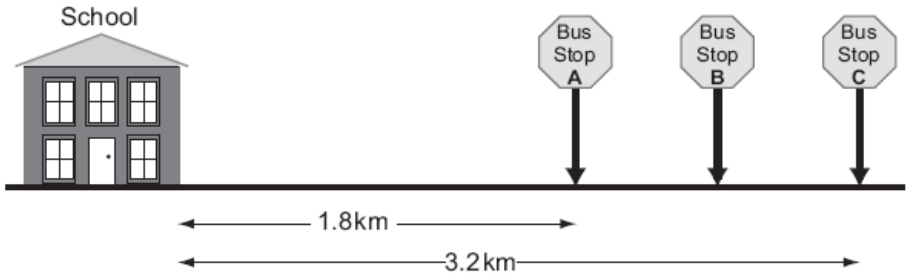
1. What does each of the options mean in dollars and cents?
2. What would each of the numbers mean as **metres** (3.5m, 3.05m, 3.50m, 35.00m) instead of dollars?
3. What would each of the numbers mean in **litres**? Kilograms?
4. Mario correctly added the four options as dollars, then as metres, and then as litres. Were his answers the same? Explain why.

Question 4

This picture shows the position of three bus stops on the road leading to a school.

Bus Stop B is **exactly halfway** between Bus Stop A and Bus Stop C.

Write your answer in the box.



What is the distance between the **School** and **Bus Stop B**? _____ km

Skill: Solve a problem involving decimals in a measurement context.
Answer key: 2.5 km

Additional questions

1. Explain how you worked this out.
2. What is the distance from Bus Stop A to Bus Stop C?
3. What is the distance from Bus Stop A to Bus Stop B? How do you know?
4. How many whole kilometres and how many metres is the distance from school to Bus Stop C? How do you know?
5. If the distance from the school to Bus Stop C was 3.3 km, what would the distance be between the school and Bus Stop B?

Question 5

Kate has this much money.

She buys an apple for 75 cents.

How much money does Kate have left?

25 cents ⬭ 35 cents ⬭ 40 cents ⬭ 45 cents ⬭

Skill: Students add and interpret decimals in a money context.
Answer key: 35c

Additional questions

1. Could she buy two apples? How much more money would she need?
2. How much money would she have if the number of 50c pieces was doubled? How many apples could she buy now?

Question 6

Dean had some money in his pocket.
He spent $1.25 and then had $1.95 left.

How much money did Dean start with?

$ _____ . _____

Skill: Students select the story that matches an expression involving a multi-step subtraction problem with decimals in a money context.
Answer key: $3.20

Additional questions

1. How did you decide what operation was needed?
2. What number sentence did you use?
3. Write your own two step number story.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book one):

- Chapter 3: Understand whole and decimal numbers
  - Key understanding 7: We can extend the patterns in the way we write whole numbers to write decimals.

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 1: Adding and subtracting numbers is useful when we:
    - change a quantity by adding more or taking some away
    - think of a quantity as combined of parts
    - equalise or compare two quantities.
  - Key understanding 2: Partitioning numbers into part-part-whole helps us relate addition and subtraction and understand their properties.

- Chapter 4: Calculate
  - Key understanding 4: Place value and basic number facts together allow us to calculate with any whole or decimal numbers.

Student worksheet

Focus

Adding and subtracting decimals in money/measurement contexts

Question 1

Dave bought one of each of these things

$1.25

$0.90

55c

$1.50

25c

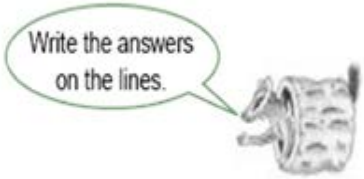
$2.50

How much did he spend altogether?

Question 2

Sam used a calculator to help him add up the cost of the groceries.

It showed **127.8**



How much does Sam need to pay for the groceries?

_____ dollars and _____ cents

Question 3

Sally has 3 dollars and 5 cents in her pocket.

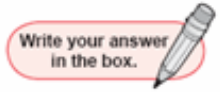
Which one of the following shows this amount?

- ○ $3.5
- ○ $3.05
- ○ $3.50
- ○ $35.00

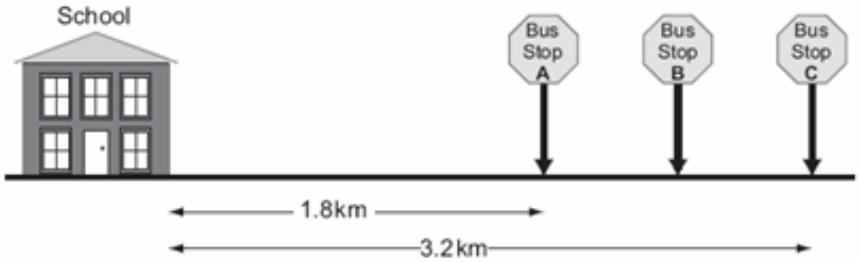
Question 4

This picture shows the position of three bus stops on the road leading to a school.

Bus Stop B is **exactly halfway** between Bus Stop A and Bus Stop C.



Not to scale



What is the distance between the **School** and **Bus Stop B**? _____ km

Question 5

Kate has this much money.

She buys an apple for 75 cents.

How much money does Kate have left?

25 cents ⬭ 35 cents ⬭ 40 cents ⬭ 45 cents ⬭

Question 6

Dean had some money in his pocket.
He spent $1.25 and then had $1.95 left.

How much money did Dean start with?

$ _____ . _____

Applying division in familiar contexts

Background information/teaching focus

Division is useful to solve problems that require sharing a quantity or grouping a quantity into portions of a given size.

Students should learn that the division operation is appropriate for problems where you know the quantity and the number of portions to be formed from it, and you want to find how many or how much will be in each portion. Students should also learn to use division for problems where you know the quantity and how many or how much is to be in each portion, and you want to find out how many portions there will be. All multiplication problem types have corresponding division problems. The inverse relationship between division and multiplication should receive careful attention. There are division problems associated with rates, ratio comparisons or changes, arrays and combinations and products of measures. Students need extensive experience in recognising and solving all of the problem types. For an explanation of multiplication and division problem types refer to the link to background notes below.

It is important that students think about whether their solutions to division problems are reasonable in the context of the question. Students need to partition into equal portions and compensate for remainders. For example, if a question asks how many boxes are required and the answer is 5.66666, then six boxes will be needed.

For further related information see *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication
  - Background notes: Multiplication and division problems p. 90.

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Western Australian Curriculum

- Year 4 – Recall multiplication facts up to 10 × 10 and related division facts (ACMNA075).
- Year 4 – Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder (ACMNA076).
- Year 5 – Use estimation and rounding to check the reasonableness of answers to calculations (ACMNA099).
- Year 5 – Solve problems involving division by a one digit number, including those that result in a remainder (ACMNA101).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Planning an excursion. Involve students in calculating cost per student. Costs could include entry, bus hire, additional adults, lunch expenses and equipment hire. This could be extended to overnight stays/school camp.
- Teams and groupings. Given the number of students in the class, investigate all grouping possibilities to give equal teams for games or co-operative learning groups.
- Best value. Provide a range of rate problems for students to solve in pairs eg I bought a bag containing 15 oranges for $4.50. What was the cost of each orange? If individual oranges were on special for 10c each what is the better buy?
- Planting the vegetable patch. After buying vegetable seedlings, students are to plan and draw possible array arrangements to ensure all seedlings are used. Decide on the best arrangement to plant the patch.
- Discuss and brainstorm scenarios where students may need to apply division. Scenarios may include students sharing items, shopping tasks or making sporting teams with equal numbers of players. Record suggestions for display.

For further activity ideas see *First Steps in Mathematics: Number* (book two):

- Sharing and grouping p. 44
- Array model p. 45
- Changing quantities p. 45
- Sample lesson 2 Relay p. 48
- Planning p. 118
- Sharing sweets p. 119

Numeracy online resources

- Year 4–5 Number: Calculate
  Learning sequence 2
  Learning sequence 6

- Year 4–5 Number: Understand operations
  Learning sequence 5
  Learning sequence 6

Question 1

Lin is packing 34 cakes into boxes.
Each full box holds 5 cakes.

What is the smallest number of boxes Lin needs to pack all the cakes?

Skill: Students divide by one-digit numbers.
Answer key: 7

Additional questions

1. How did you work out your answer? How could you check that your answer is correct?
2. How would knowing how to count by fives help you work this out?
3. What if Lin had 68 cakes, how many boxes? How does knowing the first answer help you work this out?

Question 2

Three tennis balls were packed in each can.

How many cans are needed to pack 120 tennis balls?

- ○ 360
- ○ 350
- ○ 123
- ○ 60
- ○ 40

Skill: Students use division in a familiar context.
Answer key: E

Additional questions

1. Bill has 25 cans of balls. How many balls does he have?
2. Jodie has 200 balls. She puts three balls in each can. How many cans would she need for these balls? Would they all be full? Why?

Question 3

There are 17 students in Amanda's class.

What is the **minimum** number of extra students needed to divide the class into 4 equal groups?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

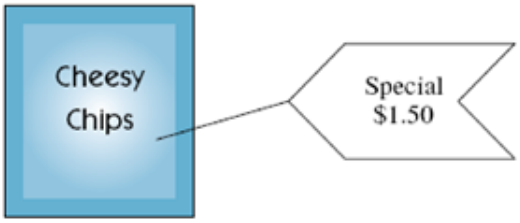
Skill: Students recall known facts to solve a problem involving division.
Answer key: B

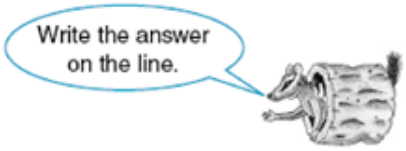
Additional questions

1. How did you work out your answer? How would knowing how to multiply by twos or fours be helpful to work out this problem?
2. Write a number sentence to show your thinking.
3. If four extra students joined Amanda's class, what equal - sized groups could be formed?
4. There are 19 students in Bill's class. Bill's and Amanda's classes are combined and are to be split into equal groups.
   What size groups, and how many of each, are possible?

Question 4

Carly has $11.
She wants to buy as many packets of 'Cheesy Chips' as possible.





How many packets can she buy? _____

Skill: Solve a problem involving decimals in a money context.
Answer key: 7

Additional questions

1. What is the cost of four bags of chips?
2. How much more money would Carly need to buy an extra bag of chips?
3. Stephen used his calculator for Question 4. He entered 11 ÷ 1.5 and got 7.3333333.
   What does the 0.3333333 mean?
   Why can't this be in his answer to Question 4?
4. Flour costs $1.50 per kilogram. Freya worked out she could buy 7.333 kilograms of flour for $11. Can Freya get the 7.333 kg of flour? Why?

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Number* (book two):

- Chapter 3: Understand operations
  - Key understanding 4: Dividing numbers is useful when we:
    - share or group a quantity into a given number of portions
    - share or group a quantity into portions of a given size
    - need the inverse of multiplication. p.40
  - Background notes (multiplication and division problems) p.90

- Chapter 4, Calculate
  - Key understanding 3: We can think of a number as a multiplication or division in different ways. We can rearrange the factors of multiplication without changing the quantity. p.114

Student worksheet

Focus

Applying division in familiar contexts

Question 1

Lin is packing 34 cakes into boxes.
Each full box holds 5 cakes.

What is the smallest number of boxes Lin needs to pack all the cakes?

Question 2

Three tennis balls were packed in each can.

How many cans are needed to pack 120 tennis balls?

- ○ 360
- ○ 350
- ○ 123
- ○ 60
- ○ 40

Question 3

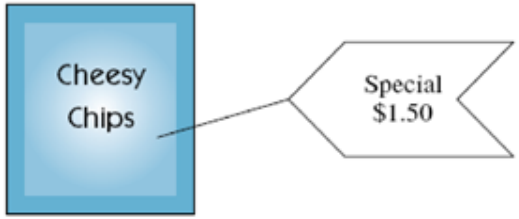
There are 17 students in Amanda's class.

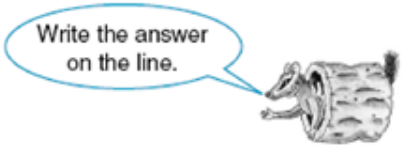
What is the **minimum** number of extra students needed to divide the class into 4 equal groups?

- ○ 2
- ○ 3
- ○ 4
- ○ 5

Question 4

Carly has $11.
She wants to buy as many packets of 'Cheesy Chips' as possible.





How many packets can she buy? _____