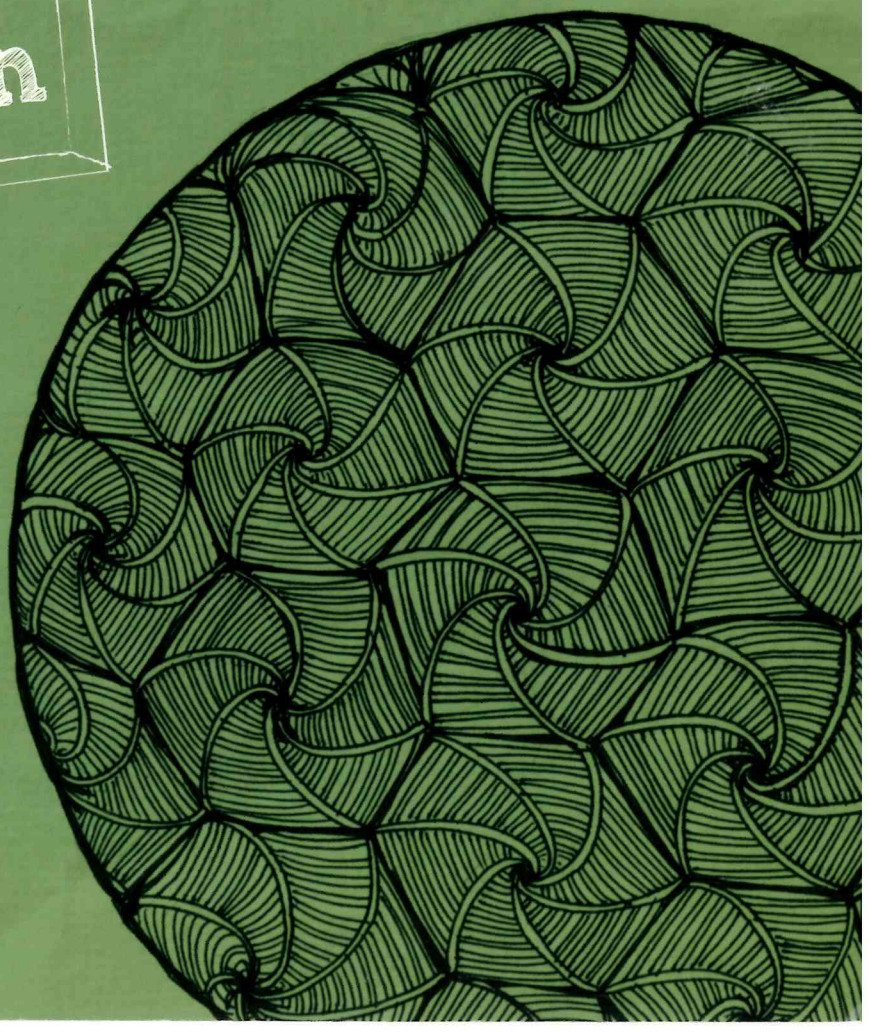
REVISE EDEXCEL GCSE (9–1)

Mathematics

REVISION WORKBOOK

Foundation

For the (9–1) exams



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REVISION WORKBOOK

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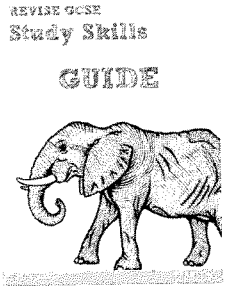

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Contents

A small bit of small print
Edexcel publishes Sample Assessment Material and the Specification on its website. This is the official content and this book should be used in conjunction with it. The questions in 'Now try this' have been written to help you practise every topic in the book. Remember: the real exam questions may not look like this.

Place value

1 (a) Write the number nine thousand, three hundred and fifty one in figures.

Guided

9 .... **(1 mark)**

(b) Write the number 4196 in words.

Four thousand, one hundred and ..... **(1 mark)**

(c) Write down the value of the 5 in the number 95 872.

5 ..... **(1 mark)**

2 Write down the number twelve thousand and sixty in a place value table.

Guided

.....	.....	Hundreds	.....	Units
.....	.....	.....	6	0

(2 marks)

3 Write these numbers in order.

(a) 165, 146, 127, 49, 169

Start with the lowest number.

..... **(1 mark)**

(b) 7429, 7249, 7942, 7924, 7028

..... **(1 mark)**

4 Write these amounts in order.

(a) £63 452, £63 593, £65 601, £63 004, £62 400

..... **(1 mark)**

(b) £1.20, 63p, £1.02, 36p, £1.12

Convert the pounds into pence and then put the numbers in order.

..... **(1 mark)**

5 Peter wrote down his weekly pocket money in order.
£1.80, £1.95, £2.10, £2.01, £2.45, £2.50
Is he correct?

..... **(1 mark)**

6 Anton is buying supplies for a charity event.
A pack of 50 paper cups costs £1.89.
A pack of 10 paper plates costs 49p.
Anton has £15 to spend.
Anton buys 250 paper cups and spends the rest on paper plates.
How many paper plates can he buy?

..... **(1 mark)**

Negative numbers

1 (a) Write the following numbers in order.

6 ~~−11~~ −4 0 4

Start with the lowest number.

Guided

−11 .... **(1 mark)**

(b) Work out

− − = +

(i) −9 + 7 = ... **(1 mark)** (ii) −7 − −4 = ... = ... **(1 mark)**

(iii) −6 − 4 = ... **(1 mark)** (iv) −10 − + 6 = ... **(1 mark)**

2 (a) Work out

+ × + = + + × − = − − × + = − − × − = +

(i) −7 × 2 = −14 **(1 mark)** (ii) 63 ÷ −9 = ... **(1 mark)**

(iii) −6 × −4 = ... **(1 mark)** (iv) −42 ÷ −6 = ... **(1 mark)**

+ ÷ + = + + ÷ − = − − ÷ + = − − ÷ − = +

3 On a certain day in Moscow the temperature at 12 noon is 7 °C but by 6 pm it has dropped by 9 °C. By 9 pm it has dropped a further 5 °C and by 12 midnight it has dropped a further 8 °C. Find the temperature at

(a) 6 pm .....°C **(1 mark)** (b) 9 pm .....°C **(1 mark)** (c) 12 midnight .....°C **(1 mark)**

Guided

(d) What was the overall drop in temperature from 12 noon to 12 midnight?

Temperature at 12 noon = 7 °C

Temperature at 12 midnight = ...

Drop in temperature = 7 − ..... = ...°C **(1 mark)**

4 The table gives information about the highest and lowest temperatures in five cities during one year.

	London	New York	Moscow	New Delhi	Lisbon
Highest temperature (°C)	30	28	25	40	29
Lowest temperature (°C)	−8	−10	−15	−7	−3

(a) What is the difference between the highest temperature in New Delhi and the lowest temperature in New York?

Write down 'highest temperature of New Delhi – lowest temperature of New York'. Remember to include units in your answer.

.....°C **(1 mark)**

(b) Which city recorded the biggest difference between the highest and lowest temperature?

..... **(1 mark)**

Viktor works out that the temperature halfway between the lowest temperature in Lisbon and the lowest temperature in Moscow is −10 °C.

(c) Is Viktor correct? Give a reason for your answer.

..... **(1 mark)**

Rounding numbers

1 Round

Guided

(a) 26 723 to the nearest thousand

27 000 **(1 mark)**

(b) 6453 to the nearest hundred

6..... **(1 mark)**

(c) 87 536 to the nearest ten.

87 5..... **(1 mark)**

2 Round 8.635 21 correct to

(a) 1 significant figure

..... **(1 mark)**

(b) 2 significant figures

..... **(1 mark)**

(c) 3 significant figures

..... **(1 mark)**

3 Round 0.003 467 2 correct to

Guided

(a) 1 significant figure

0.003 **(1 mark)**

(b) 2 significant figures

..... **(1 mark)**

(c) 3 significant figures

..... **(1 mark)**

The first significant figure is the number 3.

4 Round 38 652 correct to

Guided

(a) 1 significant figure

40 000 **(1 mark)**

(b) 2 significant figures

..... **(1 mark)**

(c) 3 significant figures

..... **(1 mark)**

You need to include enough zeroes to show the correct place value.

5 In her science class, Anjali measured the mass of some objects made from different types of materials. Here are her results.

Material	Wood	Plastic	Metal	Rubber
Mass *m* (g)	20.356	265.800	168.240	127.500

Write down the mass of the

(a) wood to 3 significant figures

..... **(1 mark)**

(b) plastic to the nearest hundred grams

..... **(1 mark)**

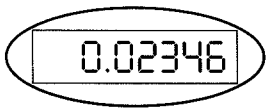
(c) metal to 2 significant figures

..... **(1 mark)**

(d) rubber to the nearest ten grams.

..... **(1 mark)**

6 Jason is weighing some objects on an electronic scale.



He writes the answer as 0.023 g correct to 3 significant figures.
Is he correct? Explain your answer.

Which number is the first significant figure?

.....

..... **(1 mark)**

Had a go ☐ Nearly there ☐ Nailed it! ☐

Adding and subtracting

1 Work out

Guided

(a) 842 + 158 + 23

```
   842
   158
+   23
 ......3
```

(1 mark)

(b) 741 − 164

```
 6 13 1
  7  4  1
− 1  6  4
 ........7
```

(1 mark)

2 Work out

(a) 7263 + 915

.... **(1 mark)**

(b) 7629 − 7452

.... **(1 mark)**

3 Kevin buys some items from a shop.
He buys a box of chocolates costing £3.65 and three rolls of wrapping paper costing £1.65 each.
He gives the cashier a £20 note.
How much change should he receive?

Guided

Convert the pounds into pence.

365 + 165 + 165 + 165 = ...

2000 − .... = ...

(3 marks)

4 There are 52 children on the pirate ship at a fairground.
When the pirate ship stops, 39 children get off and 28 children get on.
How many children are now on the pirate ship?

In this case 'get off' means subtract and 'get on' means add.

You have to show your working. Do not just write down a number.

.... **(2 marks)**

5 Part of a receipt is missing.
David pays £5 and receives 50p change.
David works out that the coffee cost £2.49.

Slice of cake	95p
Mug of tea	£1.49
Cup of coffee	

Is he correct? Explain your answer.

....

.... **(3 marks)**

Multiplying and dividing

1 Work out

Guided

(a) 83×23

Work out 83×3

Work out 83×2

$$\begin{array}{r} 83 \\ \times\ 23 \\ \hline \ldots\ldots\ldots \\ \ldots\ldots\ldots0 \\ \hline \ldots\ldots\ldots \end{array}$$

(1 mark)

(b) $972 \div 4$

$$4\overline{)9^{1}72}$$

$4 \times 2 = 8$ so 4 divides into 9 twice with remainder 1.

(2 marks)

2 Tins of biscuits come in three sizes. There are 28 biscuits in the small size and four times as many in the medium size. In the large size there are seven times as many as in the small size. How many biscuits are in the

(a) medium size

..... **(1 mark)**

(b) large size?

..... **(1 mark)**

3 A shop sold 42 boxes of flowers. Each box contained 18 flowers.
Work out the total number of flowers sold.

..... **(3 marks)**

4 Work out

Guided

(a) 962×45

Work out 962×5

Work out 962×4

$$\begin{array}{r} 962 \\ \times\ 45 \\ \hline \ldots\ldots\ldots \\ \ldots\ldots\ldots0 \\ \hline \ldots\ldots\ldots \end{array}$$

(2 marks)

(b) $442 \div 13$

$$13\overline{)442}^{\,3\ldots}$$

(2 marks)

5 Dylan packs tomato tins into boxes. Each box holds 36 tomato tins.
How many boxes will he need to pack

(a) 180 tins?

..... **(1 mark)**

(b) 324 tins?

..... **(1 mark)**

6 Sam bought five boxes of chocolates. Each box contained 25 chocolates. Sam ate 30 chocolates himself. He then shared the remaining chocolates between himself and his four friends.

(a) How many chocolates did Sam buy?

..... **(1 mark)**

(b) How many chocolates did each of Sam's friends receive?

..... **(2 marks)**

Decimals and place value

1 (a) Write down the value of the 7 in 9.74

..... **(1 mark)**

Remember the first number after the decimal point is a tenth and then a hundredth and so on.

(b) Write down the value of the 8 in 0.684

..... **(1 mark)**

(c) Write down the value of the 4 in 0.704

..... **(1 mark)**

2 Write the following numbers in order, smallest first.

3.2 6.4 6.2 12.8 1.4

..... **(1 mark)**

Guided

3 Write the following numbers in order, smallest first.

0.61 0.611 0.613 0.6 0.05

0.610 0.611 0.613 0.600 ~~0.050~~

0.050 ....

Place zeros on these numbers so they all have the same number of decimal places.

(1 mark)

4 Write the following numbers in order, smallest first.

0.73 0.7 0.725 0.778 0.78

..... **(1 mark)**

Guided

5 Using the information that $5.7 \times 43 = 245.1$ write down the value of

(a) $57 \times 43 =$

245.1 × ..... = ...

5.7 has been multiplied by 10 and 43 is unchanged. 245.1 needs to be multiplied by 10.

(1 mark)

(b) $5.7 \times 4.3 =$

245.1 ÷ ..... = ...

5.7 is unchanged and 43 has been divided by 10. 245.1 needs to be divided by 10.

(1 mark)

(c) $245.1 \div 57 =$

43 ÷ ..... = ...

245.1 is unchanged and 5.7 has been multiplied by 10. 43 needs to be divided by 10.

(1 mark)

6 Sammy writes down the following in his exercise book

435.2 ÷ 13.6 = 320

He uses the information that

$32 \times 136 = 4352$

Is he correct? Explain your answer.

Write 'yes' or 'no and give your reason. You can use working to explain your answer if it is easier than writing it as a sentence.

..... **(1 mark)**

Operations on decimals

Guided

1 Work out

(a) 4.23 + 10.4

```
  4.23
+ 10.40
------
  .....3
```

Make sure all the decimal points are lined up and then write zeros in the spaces so that all the numbers have the same number of decimal places.

(2 marks)

(b) 84.7 − 9.34

```
  84.70
−  9.34
--------
  .....
```

(2 marks)

(c) 7.32 × 16

First work out 732 × 16. In total there are 2 decimal places in the calculation, so put 2 decimal places in your answer.

(2 marks)

(d) 0.47 × 0.07

(2 marks)

(e) 83.4 ÷ 6

```
      .....
6 ) 83.4
```

(2 marks)

(f) 81.9 ÷ 1.3

(2 marks)

2 A coach ticket to the zoo costs £7.85 A teacher buys 36 of these tickets for his class.
What is the total cost of the 36 tickets?

```
   785
×   36
-------
```

Total cost = £.....

In total there are 2 decimal places in the calculation, so put 2 decimal places in your answer. Remember to write in the units.

(2 marks)

3 Charles repairs computers.
He charged a customer £123.20 to repair a computer.
It took him 8 hours to repair the computer.
How much did he charge for one hour?

£..... **(2 marks)**

4 Kitty buys hot chocolate sachets.
There are 14 hot chocolate sachets in a small box.
A small box costs £3.49.
Kitty uses 3 hot chocolate sachets each day.
Work out the how much Kitty spends on hot chocolate sachets in a four-week period.

For a longer question like this, it's a good idea to plan your strategy. Calculate:
1. number of days in a four-week period
2. number of sachets used in a four-week period
3. number of small boxes used in a four-week period
4. total cost of those boxes.

£..... **(4 marks)**

Squares, cubes and roots

1 Work out

(a) 4^2 ..... **(1 mark)**

(b) 2^3 ..... **(1 mark)**

(c) $\sqrt{81}$ ..... **(1 mark)**

(d) $\sqrt{64}$ ..... **(1 mark)**

(e) $\sqrt[3]{64}$ ..... **(1 mark)**

(f) $\sqrt[3]{8}$ ..... **(1 mark)**

(g) $\sqrt[3]{27}$ ..... **(1 mark)**

(h) $\sqrt[3]{-64}$ ..... **(1 mark)**

(i) $\sqrt[3]{-125}$ ..... **(1 mark)**

2 Write down

(a) the square of 9 ..... **(1 mark)**

(b) the cube of 5 ..... **(1 mark)**

(c) the square root of 144 ..... **(1 mark)**

(d) the cube root of 216 ..... **(1 mark)**

3 Work out the value of $5^2 + 3^3$

Square the 5 and cube the 3 before you add.

Guided

$(5 \times 5) + (3 \times 3 \times 3) =$ ..... + ... = ... **(1 mark)**

4 2, 8, 11, 15, 21, 26, 36, 49

Write down a number from the list that

(a) is a square number ..... **(1 mark)**

(b) is a cube number ..... **(1 mark)**

(c) has a square root of 7 ..... **(1 mark)**

5 Tom carried out an investigation and concluded that

'6 is a cube number since $2^3 = 6$'

Is he correct?

You can explain your answer by writing a sentence with your reason, or by showing some neat working.

Guided

No, because $2 \times 2 \times 2 =$ ..... **(1 mark)**

6 If you add three square numbers then you always get an even number.

Is this statement correct? Explain your answer.

You will need to use problem-solving skills throughout your exam – **be prepared!**

PROBLEM SOLVED!

..... **(1 mark)**

Indices

1 Write as a single power of 4

Guided

(a) $4 \times 4 = 4^{\cdots}$ **(1 mark)** (b) $4 \times 4 \times 4 \times 4 \times 4 =$ ..... **(1 mark)**

2 Simplify and leave your answers in index form.

Guided

(a) $5^3 \times 5^6$ Add the powers.

$5^3 \times 5^6 = 5^{3+6} = 5^{\cdots}$ **(1 mark)**

(b) $5^9 \div 5^6$ Subtract the powers.

$5^9 \div 5^6 = 5^{9-6} = 5^{\cdots}$ **(1 mark)**

(c) $\dfrac{5^{12}}{5 \times 5^7}$ First work out the power of 5 in the denominator.

..... **(2 marks)**

(d) $(5^3)^4$ Multiply the powers.

..... **(1 mark)**

3 Write as a single power of 9

Guided

(a) $\dfrac{1}{9} = 9^{\cdots}$ **(1 mark)** (b) $\dfrac{1}{9 \times 9 \times 9 \times 9} =$ ..... **(1 mark)**

4 Simplify and leave your answers in index form.

(a) $\dfrac{3^2 \times 3^6}{3^5}$ ..... **(2 marks)**

(b) $\dfrac{3^{12}}{3^6 \times 3^4}$ ..... **(2 marks)**

(c) $\dfrac{3^7 \times 3^6}{3 \times 3^4}$ ..... **(2 marks)**

(d) $\dfrac{3^8 \times 3^{-6}}{3 \times 3^{-5}}$ ..... **(2 marks)**

5 Complete the following.

Anything to the power zero equals ONE.

(a) $7^0 =$ ..... **(1 mark)**

(b) $7^{-1} = \dfrac{1}{\cdots\cdots}$ **(1 mark)**

(c) $7^{-2} = \dfrac{1}{7^2} = \dfrac{1}{\cdots\cdots}$ **(1 mark)**

(d) $4^{-3} =$ ..... **(1 mark)**

(e) $\left(\dfrac{3}{4}\right)^3 = \dfrac{3^3}{4^3} = \dfrac{\cdots\cdots}{\cdots\cdots}$ **(1 mark)**

(f) $\left(\dfrac{4}{5}\right)^{-2} = \left(\dfrac{5}{4}\right)^2 =$ ..... **(1 mark)**

Turn the fraction upside down, then change the negative power to a positive power.

6 $7^4 \times 7^x = \dfrac{7^9 \times 7^6}{7^3}$

Find the value of x.

$x =$ ..... **(2 marks)**

Estimation

Guided

1 Work out an estimate for the value of

Round both values to 1 significant figure.

(a) $188 \times 69 \approx 200 \times 70 =$ ..... **(1 mark)**

(b) $28.9 \div 4.85 \approx$ ..... $\div$ ..... = ... **(1 mark)**

(c) $(51.2)^3 \approx$ (.....)^3 = ... **(1 mark)**

Guided

2 Work out an estimate for the value of $\dfrac{4826}{4.1 \times 9.72}$

$\approx \dfrac{5000}{4 \times .....} = \dfrac{.....}{.....} =$ .....

1. Round all values to 1 significant figure.
2. Multiply the numbers in the denominator.
3. Cancel if possible, then divide.

(2 marks)

3 Work out an estimate for the value of $\dfrac{8.92 \times 408}{0.506}$

..... **(2 marks)**

4 Work out an estimate for the value of $\dfrac{716 \times 5.13}{0.191}$

$\dfrac{700 \times 5}{0.2} = \dfrac{3500}{0.2} = \dfrac{.....}{2}$

If you need to divide by a decimal you can multiply top and bottom by 10 or 100 to simplify the calculation.

(2 marks)

5 Work out an estimate for the value of $\dfrac{29 \times 4.90}{0.204}$

..... **(2 marks)**

6 Work out an estimate for the value of $\dfrac{5.89 \times 291}{0.051}$

..... **(2 marks)**

PROBLEM SOLVED!

7 The radius of a sphere is 6.2 cm.

(a) Work out an estimate for the surface area of the sphere.

Surface area of a sphere = $4\pi r^2$.

You will need to use problem-solving skills throughout your exam – **be prepared!**

You can round π and r to 1 significant figure.

..... cm^2 **(2 marks)**

(b) Without further calculation, explain whether your method gives you an overestimate or an underestimate for the surface area of the sphere.

..... **(1 mark)**

Factors, multiples and primes

1 (a) Write down all the factors of 36.

Guided

1 × 36, 2 × ....., ... × ....., ... × ....., ... × ..... **(2 marks)**

(b) Write down the first ten multiples of 7.

7 14 .... **(1 mark)**

2 Use a word from the box to complete these sentences correctly.

multiple	factor
square root	cube

(a) 12 is a ..... of 132. **(1 mark)**

(b) 132 is a ..... of 12. **(1 mark)**

3 The table shows some numbers.

41	42	43	44	45	46	47	48	49

Three of the numbers are prime numbers.
Put a tick (✓) underneath each of these three numbers. **(1 mark)**

4 Here is a list of numbers:

2 8 6 12 21 25 33 49

From the list write down

(a) a factor of 30 ..... **(1 mark)**

(b) a multiple of 7 ..... **(1 mark)**

(c) two factors of 24 that have a product of 48 ..... **(2 marks)**

5 Write down three factors of 28 which have a sum between 20 and 25.

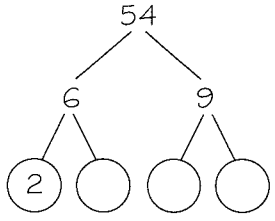
Start by listing the factors of 28.

.... **(2 marks)**

6 Express the following numbers as products of their prime factors.
Give your answers in index form.

Guided

(a) 54



54 = 2 × ..... × ..... × ..... = 2 × ..... **(3 marks)**

The prime factors are always circled.

(b) 96 (c) 126 (d) 252

..... **(3 marks)** ..... **(3 marks)** ..... **(3 marks)**

HCF and LCM

1 (a) Find the highest common factor (HCF) of 72 and 84.

Guided

1. List the factors of 72.
2. List the factors of 84.
3. Circle all the common factors.
4. Choose the highest common factor.

1 × 72, 2 × ....., ... × ....., ... × ....., ... × ....., ... × .....

1 × 84, 2 × ....., ... × ....., ... × ....., ... × ....., ... × .....

..... **(3 marks)**

(b) Find the lowest common multiple (LCM) of 12 and 15.

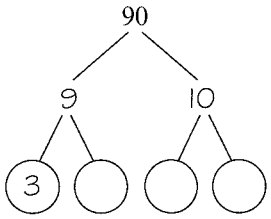
..... **(2 marks)**

2 (a) Write the following numbers as products of powers of their prime factors.

Guided

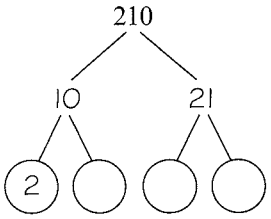
Circle any prime numbers – that's the end of a branch.

(i) 90



90 = ... × 3 – x ..... **(2 marks)**

(ii) 210



210 = 2 × ..... × ..... × ..... **(2 marks)**

(b) Find the highest common factor (HCF) of 90 and 210.

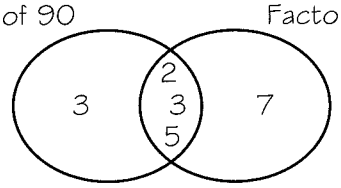
90 = ... × 3 – x .....

210 = 2 × ..... × ..... × .....

HCF = ... × ..... × ..... = ...

You could also use a Venn diagram to answer this question.

Factors of 90 Factors of 210



Circle all the prime numbers which are common to both products of prime factors. Multiply the circled numbers together to find the HCF.

(1 mark)

(c) Find the lowest common multiple (LCM) of 90 and 210.

LCM = ... × ..... × ..... = ...

To find the LCM, multiply the HCF by the numbers in both products that were not circled in part (b).

(1 mark)

3 (a) Find the highest common factor (HCF) of 36 and 48.

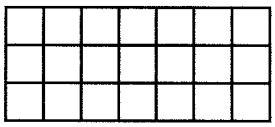
..... **(1 mark)**

(b) Find the lowest common multiple (LCM) of 36 and 48.

..... **(1 mark)**

Fractions

1 Shade $\frac{3}{7}$ of this shape.



(1 mark)

2 Write the following fractions in their simplest form.

Guided

(a) $\frac{30}{60}$ ..... **(1 mark)**

(b) $\frac{12}{18}$ ..... **(1 mark)**

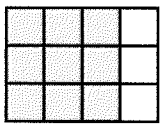
(c) $\frac{35 \div 5}{120 \div 5} = \frac{\quad}{\quad}$

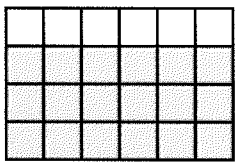
What number will go into 35 and 120?

(1 mark)

(d) $\frac{24}{84}$ ..... **(1 mark)**

3 Write down the fraction of these shapes that are shaded.
Write your fraction in its simplest form.

(a)  ..... **(2 marks)**

(b)  ..... **(2 marks)**

4 Work out

Guided

(a) $\frac{3}{4}$ of £60

£60 ÷ 4 = ...

..... × 3 = £..... **(2 marks)**

(b) $\frac{4}{5}$ of £80

£..... **(2 marks)**

(c) $\frac{7}{8}$ of £160

£..... **(2 marks)**

(d) $\frac{5}{7}$ of £210

£..... **(2 marks)**

5 Sandeep bought 30 punnets of strawberries for £20.
$\frac{1}{6}$ of the punnets were rotten so he threw them away.
He sold the remaining punnets for £1.50 each.
Work out Sandeep's profit.

£..... **(4 marks)**

6 Tom bought 20 boxes of flowers. Each box cost him £6.
Each box contains 15 flowers.
He sells $\frac{3}{5}$ of the total number of flowers for 70p each.
He then sells the remaining at 50p each.
Work out the total profit Tom makes.

£..... **(5 marks)**

Operations on fractions

1 Work out

Write both fractions as equivalent fractions with the same denominator.

Guided

(a) $\frac{1}{3} + \frac{2}{5}$

$= \frac{5}{15} + \frac{\ldots\ldots}{15} = \frac{\ldots\ldots}{15}$ **(2 marks)**

(b) $\frac{4}{5} - \frac{1}{4}$

$= \frac{\ldots\ldots}{20} - \frac{\ldots\ldots}{20} = \frac{\ldots\ldots}{20}$ **(2 marks)**

(c) $\frac{6}{7} + \frac{3}{8}$

..... **(2 marks)**

(d) $\frac{5}{9} - \frac{4}{7}$

..... **(2 marks)**

2 Work out

(a) $\frac{1}{2} \times \frac{1}{3}$

..... **(1 mark)**

(b) $\frac{5}{11} \times \frac{3}{4}$

..... **(1 mark)**

(c) $\frac{4}{5} \div \frac{3}{10}$

Turn the second fraction upside down and change ÷ into ×

..... **(2 marks)**

(d) $\frac{2}{3} \div \frac{4}{9}$

..... **(2 marks)**

3 A man wins some money and decides to give it to his three children.

Guided

Andrew receives $\frac{2}{5}$ of the money, Ben receives $\frac{1}{3}$ of the money and Carla receives the rest.

Work out the fraction that Carla receives.

Write 1 as a fraction with the same numerator and denominator. $1 = \frac{15}{15}$

$\frac{2}{5} + \frac{1}{3} = \frac{\ldots\ldots}{15} + \frac{\ldots\ldots}{15} = \frac{\ldots\ldots}{15}$

$1 - \frac{\ldots\ldots}{15} = \frac{\ldots\ldots}{15} =$ **(3 marks)**

4 A garage has a supply of 210 litres of oil.

Amy uses $\frac{4}{7}$ of the supply and Brad uses $\frac{1}{5}$ of the supply.

(a) What fraction of the supply is left?

..... **(3 marks)**

(b) How much oil is left?

..... litres **(2 marks)**

Mixed numbers

1 Work out

Guided

(a) $3\frac{4}{5} + 2\frac{3}{4}$

You need to write mixed numbers as improper fractions before you do any calculations.

$= \frac{19}{5} + \frac{\ldots\ldots}{4} = \frac{\ldots\ldots}{20} + \frac{\ldots\ldots}{20} = \frac{\ldots\ldots}{20} = \ldots\ldots\ldots\ldots$

Write your final answer as a mixed number in its simplest form.

(3 marks)

(b) $4\frac{2}{5} - 2\frac{3}{10}$

$= \frac{\ldots\ldots}{5} - \frac{\ldots\ldots}{10} = \frac{\ldots\ldots}{10} - \frac{\ldots\ldots}{10} = \frac{\ldots\ldots}{10} = \ldots\ldots\ldots\ldots$ **(3 marks)**

2 Work out

Guided

(a) $1\frac{2}{3} \times 2\frac{3}{10}$

$= \frac{\ldots\ldots}{3} \times \frac{\ldots\ldots}{10} = \frac{\ldots\ldots}{\ldots\ldots} = \ldots\ldots\ldots\ldots$ **(3 marks)**

(b) $4\frac{2}{3} \div 1\frac{2}{5}$

Don't forget to replace the ÷ with × sign and then flip the fraction over.

$= \frac{\ldots\ldots}{3} \div \frac{\ldots\ldots}{5} = \frac{\ldots\ldots}{3} \times \frac{\ldots\ldots}{\ldots\ldots} = \frac{\ldots\ldots}{\ldots\ldots} = \ldots\ldots\ldots\ldots$ **(3 marks)**

3 Work out

(a) $3\frac{1}{2} \times 2\frac{4}{7}$

..... **(3 marks)**

(b) $5\frac{1}{3} \div 1\frac{4}{9}$

..... **(3 marks)**

4 It takes $4\frac{2}{3}$ hours to paint a room, and $1\frac{1}{4}$ hours for all the paint to dry.

How long does it take altogether?

..... hours **(3 marks)**

5 James has $1\frac{1}{6}$ litre of milk left in the fridge and needs $2\frac{2}{9}$ litres for a recipe.

How much more milk does he need?

..... litres **(3 marks)**

6 A tape is $14\frac{2}{3}$ m long. How many pieces of tape each of $1\frac{2}{9}$ m can be cut from the length of tape?

..... **(3 marks)**

Calculator and number skills

1 Work out

Guided

(a) $11 + 8 \div 2$

11 + ... = ... **(1 mark)**

(b) $2 + 9 \times 10 + 3$

..... **(1 mark)**

(c) $8 + (3 \times 20) \div 6$

..... **(1 mark)**

(d) $(14 - 5)^2$

..... **(1 mark)**

2 Work out

You must use BIDMAS.

(a) $\dfrac{27 + 3 \times 3}{3 \times 2}$ ..... **(1 mark)**

(b) $\dfrac{13 - 12 \div 4}{4 + 3 \times 2}$ ..... **(1 mark)**

(c) $\dfrac{12 + 3 \times 6}{4 + 3 \div 3}$ ..... **(1 mark)**

3 Find the value of $\dfrac{4.5 + 3.75}{3.2^2 - 5.53}$

Guided

Write down all the figures on your calculator display.

8.25 / ..... = ... **(2 marks)**

.....

4 (a) Find the value of $\sqrt{30.25} + 1.75^2$

Enter the numbers into the calculator. You might need to press the SD button to get your answer as a decimal number.

..... **(2 marks)**

(b) Write your answer to part (a) correct to one significant figure.

..... **(1 mark)**

5 (a) Find the value of $\dfrac{\sqrt{18.3 + 3.6^2}}{2.8 \times 1.6}$

Write down all the figures on your calculator display.

..... **(2 marks)**

(b) Write your answer to part (a) correct to 3 significant figures.

..... **(1 mark)**

6 (a) Find the value of $\dfrac{32.5 \times \sqrt[3]{16.3}}{9.5 \times 3.1}$

Write down all the figures on your calculator display.

..... **(2 marks)**

(b) Write your answer to part (a) correct to 2 significant figures.

..... **(1 mark)**

Standard form 1

Guided

1 (a) Write 45 000 in standard form.

Count decimal places from the right. How many jumps do you need to make to get 4.5?

45 000 = 4.5 × 10.....

(1 mark)

(b) Write 3.4×10^{-5} as an ordinary number.

The power of 10 is negative so the number is less than 1.

3.4 × 10⁻5 = 0.0.....

(1 mark)

(c) Write 28×10^{6} in standard form.

..... **(1 mark)**

2 Write in standard form

(a) 567 000 ..... **(1 mark)**

(b) 0.0005567 ..... **(1 mark)**

(c) 567×10^{8} ..... **(1 mark)**

3 (a) Write 6 740 000 in standard form.

..... **(1 mark)**

$n = 6\,740\,000$ and $m = 5.42 \times 10^{5}$

Work out, giving your answers in standard form correct to 2 significant figures

Use the (×10ˣ) to enter standard form numbers on your calculator.

Guided

(b) $n + m$

6740000 + ...

= ..... **(2 marks)**

(c) $n - m$

6740000 − .....

= ..... **(2 marks)**

4 In 2014 the population of the United Kingdom was 6.5×10^{7}.

In 2014 the population of the Russia was 1.4×10^{8}.

(a) Work out the combined population of the United Kingdom and Russia. Give your answer in standard form.

..... **(2 marks)**

(b) Work out the difference between the population of the United Kingdom and the population of Russia. Give your answer in standard form.

..... **(2 marks)**

Guided

5 In 2011, NASA launched the spacecraft Curiosity to land on the planet Mars. The distance from Earth to Mars is 5.63×10^{8} km. The time it took to reach Mars was 6050 hours.

Work out the average speed, in km/h, of the spacecraft Curiosity.

Give your answer in standard form correct to 2 significant figures.

$\text{speed} = \frac{\text{distance}}{\text{time}}$ = ... **(2 marks)**

Standard form 2

Guided

6 Work out, giving your answers in standard form

Multiply the number parts then add the powers.

(a) $(3 \times 10^6) \times (6 \times 10^{-3})$

$= (3 \times \ldots\ldots) \times (10^6 \times 10^{\ldots\ldots}) = \ldots\ldots \times 10^{\ldots\ldots} = \ldots\ldots \times 10^{\ldots\ldots}$ **(2 marks)**

(b) $(8 \times 10^6) \div (4 \times 10^{-14})$

$= (8 \div \ldots\ldots) \times (10^6 \div 10^{\ldots\ldots}) = \ldots\ldots \times 10^{\ldots\ldots} = \ldots\ldots \times 10^{\ldots\ldots}$ **(2 marks)**

Guided

7 Work out, giving your answers in standard form

(a) $5.1 \times 10^3 + 6.5 \times 10^4$

5100
+ 65000

..... **(2 marks)**

(b) $7.6 \times 10^5 - 8 \times 10^3$

760000
− 8000

..... **(2 marks)**

8 A and B are standard form numbers.

$A = 5.6 \times 10^9$ $B = 8 \times 10^{-2}$

Calculate, giving your answers in standard form

(a) $2A$

..... **(2 marks)**

(b) $A \times B$

..... **(2 marks)**

(c) $A \div B$

..... **(2 marks)**

9 It takes light 8 minutes to travel from the Sun to the Earth.

The speed of light is 3×10^8 m/s.

Work out the distance, in km, from the Sun to the Earth.

Give your answer in standard form.

$\text{speed} = \frac{\text{distance}}{\text{time}}$

..... **(3 marks)**

10 The distance from the Sun to the planet Neptune is approximately 4.5×10^9 km.

The speed of light is 3×10^8 m/s.

Work out how long, in seconds, it takes light to travel from the Sun to the planet Neptune.

Convert the distance into metres, then use $\text{time} = \frac{\text{distance}}{\text{speed}}$

..... **(3 marks)**

Counting strategies

Guided

1 Ajay writes down one letter from the word ART then he writes down one number from 1, 2 and 3.

A	R	T

1	2	3

Do not write down repeats such as (1, A) which is the same as (A, 1).

List all the possible combinations Ajay could write down. One has been done for you.

(A,1) (A, ...) (A, ...) (R, ...) (R, ...) (R, ...)
(T, ...) (T, ...) (T, ...)

(2 marks)

Guided

2 Brett goes to a restaurant.
He can choose from three types of curry and from three types of naan.
Brett is going to choose one curry and one naan.
List all the possible combinations Brett can choose.

Curry	Naan
Chicken (C)	Plain
Lamb	Garlic
Vegetable	Butter

Label chicken as C, and so on.

.....

(2 marks)

3 Emily has four tiles.
One tile is marked W, one tile is marked X, one tile is marked Y and one tile is marked Z.
Emily chooses two of these tiles.
Write down all the possible combinations she can get.

W	X	Y	Z

.....

(2 marks)

Guided

4 Kate has three cards. Each card has a different digit on it.
Kate wants to make a three-digit number.
Each number is made with all three cards.
How many different numbers can Kate make?

3	6	9

.....

(2 marks)

5 There are four players in a competition, Asha, Bev, Chloe and Dan.
Each player must play each other once.
How many games will be played in total?

Label Asha, Bev, Chloe and Dan as A, B, C and D respectively.

Remember (A, B) is the same as (B, A).

(A, ...) (A, ...) (A, ...) (B, ...) .....

.....

(2 marks)

6 A school chess league contains the following five teams, Hanover, Norman, Stuart, Tudor and Windsor.
Each team must play each other **twice**.
How many games will be played in total?

.....

(2 marks)

Problem-solving practice 1

1 Find four different prime numbers you can add together to get a number greater than 30 and less than 40.

..... **(2 marks)**

2 Crisps cost 35p per packet. A bottle of lemonade costs £1.25. Nigel buys five packets of crisps and one bottle of lemonade. He pays with a £10 note.
Work out how much change he should get.

£..... **(3 marks)**

3 Here is part of a menu in Harry's café.

Cup of tea	£1.30
Cup of coffee	£1.40

Abbie buys some cups of coffee. She has £15.
Work out the greatest number of cups of coffee she can buy.

..... **(2 marks)**

4 A shop sells packets of sweets. There are 36 packets of sweets in each box.
In November, the shop sold all the packets of sweets in 120 boxes.
In December, the shop sold all the packets of sweets in 230 boxes.

(a) Work out the total number of packets of sweets the shop sold.

..... **(2 marks)**

(b) Vans deliver the boxes to the shop. A van can carry 72 boxes.
Sandra wants 452 boxes. Sandra works out she needs 6 vans to deliver the boxes.
Is she correct? You must show all your working.

(2 marks)

5 Which of these fractions is the larger? $\frac{2}{3}$ or $\frac{3}{5}$?
You must show clearly how you got your answer.

(3 marks)

6 A machine makes 48 bolts every hour. The machine makes bolts for $7\frac{1}{2}$ hours each day, on 5 days of the week. The bolts are packed into boxes. Each box holds 30 bolts. How many boxes are needed for all the bolts made each week?

..... boxes **(4 marks)**

Problem-solving practice 2

7 There are 180 counters in a bag. The counters are brown or white or blue.
$\frac{3}{5}$ of the counters are brown. $\frac{1}{4}$ of the counters are white.
Work out the number of blue counters.

..... **(4 marks)**

8 Tammy buys 3 compost bags. Each compost bag weighs 24 kg.
She can fill a small pot by using $\frac{4}{9}$ of a compost bag.
How many pots can she fill?

..... **(3 marks)**

9 A plumber has two lengths of copper pipe.
One pipe is 54 cm and the other pipe is 72 cm.
He wants to cut them and make smaller pipes to use them in boilers.
He wants the smaller pipes to be the same length with no copper left over.
What is the greatest length, in cm, that he can make the smaller pipes?

.....cm **(3 marks)**

10 Buses leave Wolverhampton to Penn every 12 minutes and to Wombourne every 15 minutes.
A bus to Penn and a bus to Wombourne leave Wolverhampton at 8 am.
At what time will a bus to Penn and a bus to Wombourne next leave Wolverhampton at the same time.

..... **(3 marks)**

11 An atomic particle has a lifetime of 4.86×10^{-5} seconds.
It travels at a speed of 6.2×10^{4} m/s. Show that the distance travelled by the atomic particle is approximately 3 m.

(2 marks)

12 Find the value of x.

$$3^x \times 3^{4x} = \frac{3^7 \times 3^9}{3^2}$$

$x =$ ..... **(2 marks)**

Answers

NUMBER

1. Place value

1 (a) 9351
(b) Four thousand, one hundred and ninety six
(c) 5000

2

ten thousands	thousands	hundreds	tens	units
1	2	0	6	0

3 (a) 49, 127, 146, 165, 169
(b) 7028, 7249, 7429, 7924, 7942
4 (a) £62 400, £63 004, £63 452, £63 593, £65 601
(b) 36p, 63p, £1.02, £1.12, £1.20
5 He is incorrect
6 110 paper plates

2. Negative numbers

1 (a) −11, −4, 0, 4, 6
(b) (i) −2 (ii) −3 (iii) −10 (iv) −16
2 (i) −14 (ii) −7 (iii) 24 (iv) 7
3 (a) −2°C (b) −7°C (c) −15°C (d) 22°C
4 (a) 50°C
(b) New Delhi
(c) No, answer is 9°C

3. Rounding numbers

1 (a) 27 000 (b) 6500 (c) 87 540
2 (a) 9 (b) 8.6 (c) 8.64
3 (a) 0.003 (b) 0.0035 (c) 0.00347
4 (a) 40 000 (b) 39 000 (c) 38 700
5 (a) 20.4 (b) 300 g (c) 170 (d) 130 g
6 No, correct answer is 0.0235

4. Adding and subtracting

1 (a) 1023 (b) 577
2 (a) 8178 (b) 177
3 £11.40
4 41
5 He is not correct. Coffee costs £2.06

5. Multiplying and dividing

1 (a) 1909 (b) 243
2 (a) 112 (b) 196
3 756
4 (a) 43 290 (b) 34
5 (a) 5 boxes (b) 9 boxes
6 (a) 125 chocolates (b) 19 chocolates

6. Decimals and place value

1 (a) $\frac{7}{10}$ (b) $\frac{8}{100}$ (c) $\frac{4}{1000}$
2 1.4, 3.2, 6.2, 6.4, 12.8
3 0.05, 0.6, 0.61, 0.611, 0.613
4 0.7, 0.725, 0.73, 0.778, 0.78
5 (a) 2451 (b) 24.51 (c) 4.3
6 He is incorrect because 435.2 ÷ 13.6 = 32

7. Operations on decimals

1 (a) 14.63 (b) 75.36 (c) 117.12
(d) 0.0329 (e) 13.9 (f) 63
2 £282.60
3 £15.40
4 £20.94

8. Squares, cubes and roots

1 (a) 16 (b) 8 (c) 9
(d) 8 (e) 4 (f) 2
(g) 3 (h) −4 (i) −5
2 (a) 81 (b) 125 (c) 12 (d) 6
3 52
4 (a) 36 or 49 (b) 8 (c) 49
5 No because 2 × 2 × 2 = 8
6 No because 16 + 4 + 1 = 21 which is odd

9. Indices

1 (a) 4^2 (b) 4^5
2 (a) 5^9 (b) 5^3 (c) 5^4 (d) 5^{12}
3 (a) 9^{-1} (b) 9^{-4}
4 (a) 3^3 (b) 3^2 (c) 3^8 (d) 3^6
5 (a) 1 (b) $\frac{1}{7}$ (c) $\frac{1}{49}$ (d) $\frac{1}{64}$
(e) $\frac{27}{64}$ (f) $\frac{25}{16}$
6 $x = 8$

10. Estimation

1 (a) 14 000 (b) 6 (c) 125 000
2 125
3 7200
4 17 500
5 750
6 36 000
7 (a) 432 cm² (b) Underestimate

11. Factors, multiples and primes

1 (a) 1 × 36, 2 × 18, 3 × 12, 4 × 9, 6 × 6
(b) 7, 14, 21, 28, 35, 42, 49, 56, 63, 70
2 (a) factor (b) multiple
3 41, 43, 47
4 (a) 2 or 6 (b) 21 or 49 (c) 6 and 8
5 14 + 7 + 1
6 (a) 2×3^3 (b) $2^5 \times 3$ (c) $2 \times 3^2 \times 7$ (d) $2^2 \times 3^2 \times 7$

12. HCF and LCM

1 (a) 12 (b) 60
2 (a) (i) $2 \times 3^2 \times 5$ (ii) $2 \times 3 \times 5 \times 7$
(b) 30 (c) 630
3 (a) 12 (b) 144

13. Fractions

1 

2 (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{7}{24}$ (d) $\frac{2}{7}$
3 (a) $\frac{3}{4}$ (b) $\frac{3}{4}$
4 (a) £45 (b) £64 (c) £140 (d) £150
5 £17.50
6 £66

14. Operations on fractions

1 (a) $\frac{11}{15}$ (b) $\frac{11}{20}$ (c) $\frac{69}{56}$ (d) $-\frac{1}{63}$
2 (a) $\frac{1}{6}$ (b) $\frac{15}{44}$ (c) $\frac{40}{15}$ (d) $\frac{18}{12}$
3 $\frac{4}{15}$
4 (a) $\frac{8}{35}$ (b) 48 litres

15. Mixed numbers

1 (a) $6\frac{11}{20}$ (b) $2\frac{1}{10}$
2 (a) $\frac{23}{6}$ (b) $\frac{10}{3}$
3 (a) 9 (b) $\frac{48}{13}$
4 $\frac{71}{12}$ hours
5 $\frac{19}{18}$ litres
6 12

16. Calculator and number skills

1 (a) 15 (b) 95 (c) 18 (d) 81
2 (a) 6 (b) 1 (c) 6
3 1.751592357

4 (a) 8.5625 (b) 9
5 (a) 1.248005424 (b) 1.25
6 (a) 2.798083024 (b) 2.8

17. Standard form 1

1 (a) 4.5×10^4 (b) 0.000034 (c) 2.8×10^7
2 (a) 5.67×10^5 (b) 5.67×10^{-5} (c) 5.67×10^{10}
3 (a) 6.74×10^6 (b) 7.3×10^6 (c) 6.2×10^6
4 (a) 2.05×10^8 (b) 7.5×10^7
5 9.3×10^4

18. Standard form 2

6 (a) 1.8×10^4 (b) 2×10^{20}
7 (a) 7.01×10^4 (b) 7.52×10^5
8 (a) 1.12×10^{10} (b) 4.48×10^8 (c) 7×10^{10}
9 1.44×10^8
10 15 000

19. Counting strategies

1 (A,2), (A,3), (R,1), (R,2), (R,3), (T,1), (T,2), (T,3)
2 (C,P), (C,G), (C,B), (L,P), (L,G), (L,B), (V,P), (V,G), (V,B)
3 (W,X), (W,Y), (W,Z), (X,Y), (X,Z), (Y,Z)
4 6
5 6
6 20

20. Problem-solving practice 1

1 2, 5, 13, 17 (there are other possibilities, for example, 2, 3, 11, 19)
2 £7
3 (a) 10 cups of coffee
4 (a) 12 600
(b) She is incorrect, $72 \times 6 = 432$, she needs 7 vans
5 $\frac{2}{3}$
6 60 boxes

21. Problem-solving practice 2

7 27
8 6
9 18 cm
10 9 am
11 $(4.86 \times 10^{-5}) \times (6.2 \times 10^4) = 3.01 \approx 3$ m
12 $\frac{14}{5}$

ALGEBRA

22. Collecting like terms

1 (a) Expression (b) Formula (c) Equation
2 (a) $5x$ (b) $6xy$
3 (a) $4x + 2y$ (b) $5ab$ (c) $t + 11v$ (d) $3c - 2d$
4 (a) $2x$ (b) $3t^2$ (c) $3a + 8b + 7$ (d) $x - 7y$
5 (a) $3n$ (b) $6p + q$ (c) $3m + 4n$ (d) $2a + 6b + 5$
6 (a) $2y^2$ (b) $3x^2 + 2x$

23. Simplifying expressions

1 (a) y^2 (b) $3mt$
2 (a) w^4 (b) $28d$ (c) $30k$ (d) $40jk$
3 (a) $15x^2$ (b) $6ef$ (c) $4a$ (d) $8b$
4 (a) $35gh$ (b) $8t^3$ (c) $3x$ (d) $4y$
5 (a) $24abc$ (b) $8p$
6 $2(x \times y)$ and $4xy \div 2$

24. Algebraic indices

1 (a) a^9 (b) a^3 (c) a^4 (d) a^{12}
2 (a) t^3 (b) t^3 (c) t^8 (d) t^6
3 (a) x^{12} (b) $64x^6$ (c) $8x^9$ (d) $12x^7$
(e) $12x^7y^5$ (f) $3x^2y^3$
4 (a) 8 (b) 5 (c) 5
5 1.5

25. Substitution

1 240 km
2 (a) 23 (b) −11
3 (a) 34 (b) 19
4 (a) −6 (b) 100 (c) 12
5 (a) 104 (b) 23 (c) 20
6 Abbie is correct, $\frac{1}{2} \times 2 \times 3^2 = 9$

26. Formulae

1 50 minutes
2 £175
3 30
4 36
5 18
6 52
7 −4°F
8 $y = 3x^2 - 4x + 3$
$y = 3(-2)^2 - 4(-2) + 3$
$y = 12 + 8 + 3$
$y = 23$

27. Writing formulae

1 $4g + 5h$
2 $S = 10m + 20n$
3 $P = 30n + 50$
4 $T = 8(m + 5)$
5 $P = 10x + 2$
6 (a) $B = n + 4$
(b) Yes, because Carl is $3n$ years old

28. Expanding brackets

1 (a) $3x + 6$ (b) $4x + 20$ (c) $3x + 6$
(d) $12x + 18$ (e) $\sqrt{2x} - 2$ (f) $21x - 56$
2 (a) $-3x + 9$ (b) $-4x - 12$ (c) $-6x + 30$
(d) $-4x - 6$ (e) $-8x + 2$ (f) $-2x + 4$
3 (a) $x^2 + x$ (b) $x^2 + 5x$ (c) $2x^2 - 18x$
(d) $6x^2 - 9x$ (e) $-2x^2 + 3x$ (f) $-12x^2 + 15x$
4 (a) $7x + 6$ (b) $5x + 14$ (c) $13x - 11$
(d) $6x^2 - 20x$
5 $a = 20$, $b = -19$
6 $p = 3$, $q = 18$

29. Factorising

1 (a) $3(x + 2)$ (b) $6(a + 3)$ (c) $2(p - 3)$
(d) $5(y - 3)$ (e) $3(t + 8)$ (f) $4(g - 5)$
2 (a) $x(x + 6)$ (b) $x(x - 4)$ (c) $x(x - 9)$
(d) $x(x - 12)$ (e) $x(x + 5)$ (f) $x(x - 1)$
3 (a) $3p(p + 2)$ (b) $8y(y - 3)$ (c) $9t(t - 4)$
4 (a) $4d(d + 3)$ (b) $6x(x - 3)$ (c) $7n(n - 5)$
5 (a) $2x^2 - 3xy$, 3, $3x$, $2x - 3y$
(b) 4, $(3mn + m^2)$, $4m$, $(3n + m)$, m, $(12n + 4m)$
6 $10x + 15 - 4x + 12$
$= 6x + 27$
$= 3(2x + 9)$

30. Linear equations 1

1 (a) 16 (b) −5 (c) −15
(d) −36 (e) −120 (f) −9
2 (a) 5 (b) 12 (c) 2
(d) 3 (e) 19 (f) −46
3 (a) 6 (b) −3 (c) −4
(d) −4 (e) 15 (f) −24
4 (a) $5t - 9$ (b) $36 = 5t - 9$ (c) 9

31. Linear equations 2

5 (a) 2 (b) −8 (c) $\frac{3}{4}$
6 (a) 5 (b) 2 (c) −3 (d) 3
7. $\frac{7}{2}$

32. Inequalities

1 (a) $x \leqslant 4$ (b) $x > -1$
(c) $-2 < x < 4$ (d) $-1 < x \leqslant 5$