Spring Progress Check Revision Material

Year 8 Set 4 - 5

Theta

Test Date: Friday 19 Jan

How to revise for Maths?

- *Practise is key! Attached you will find some questions to help you do that.*
- *Once you've answered the questions – mark your work.*
- *If you get something wrong, look back on what you did and try work out where your mistake is. Unsure? Take your answers to your teacher or to Maths club on a Thursday and get help ahead of the test!*
- *Good luck!*

6 Unit test

Log how you did on your Student Progression Chart.

1. Round each amount to two decimal places.
   a £66.255
   b £134.0875
   c £236.625

2. This table shows the distance between London and four other large cities. Round each distance to the nearest 1000 km.

From	To	Distance
London	Auckland	18 327 km
London	Tokyo	9 582 km
London	Buenos Aires	11 102 km
London	Los Angeles	8 778 km

3. Round each number to three decimal places.
   a 4.7913
   b 37.0004
   c 21.4897

4. Work out
   a 26.1 + 9.65
   b 10 − 1.72
   c 9.4 + 6.57 − 11.46

5. Work out
   a 345 × 0.62
   b 3.5 × 0.15
   c 0.05 × 0.64

6. Long rolls of cloth need to be cut in the ratio 5 : 1 : 2. How long is the longest piece of cloth from a roll 48 m long?

7. Rearrange these numbers in *ascending* order.
   45.39, 45.18, 45.275, 45.33, 66.5, 66.39

8. Work out
   a 36 ÷ 0.1
   b 419 ÷ 0.01
   c 4.8 ÷ 0.6
   d 48 ÷ 0.08
   e 8.4 ÷ 0.2
   f 0.63 ÷ 0.3

9. Rearrange these numbers in *ascending* order.
   −9.31, −9.78, −9.57, −9.3, −9.53, −9.511, −9.9

10. Simplify each ratio.
    a 12 : 16.8
    b 1.5 : 7.5

11. Sophie mixes acid and water in the ratio 2 : 5.2
    She makes 288 m*l* of the mixture.
    How much acid and how much water did she mix?

12 Ben makes orange paint by mixing red, yellow and white paint in the ratio 20 : 16 : 1.5.
How much of each colour does he need to make 1.5 litres of orange paint?

13 $471 \times 34 = 16014$

Use this multiplication fact to work out

a 4.71×0.34 b 0.471×34

c 47.1×0.034 d 0.471×0.34

14 50 inches is about the same distance as 127 cm.
What is the ratio of inches to cm?
Give your answer as a unit ratio.

15 Work out

a 54.18×6.7 b $78.03 \div 1.7$

16 Copy and complete these. Put the correct sign, < or >, between each pair of numbers.

a $40.43 \square 58.57$ b $68.6 \square 66.79$ c $87.62 \square 87.43$

d $-7.62 \square -7.7$ e $-6.145 \square -6.154$ f $-9.803 \square -9.088$

17 John's savings account pays 2.5% interest per year.
John has £500 in savings.
How much interest will he have earned after 1 year?

Challenge

18

0.12	0.86	1.188	12.5
5.04	27.5	9	0.7
11.3	6.3	0.1	33
51.3	2.97	10.7	10.8

Each of the numbers in the blue rectangle can be made by adding, subtracting, multiplying or dividing some or all of these decimal numbers.

| 0.3 | 0.4 | 1.4 | 9.9 | 3.6 | 6.2 | 5.7 |

a You can use each number a maximum of once in each calculation.
Make as many of the numbers from the blue rectangle as you can.
Keep a note of the calculations you do to avoid duplication.

b Following the same rules:
What is the highest number you can make?
What is the lowest number you can make?
What is the number closest to zero you can make?

19 **Reflect** Look back at the questions in this unit test.
Which took the shortest time to answer? Why?
Which took the longest time to answer? Why?
Which took the most thought to answer? Why?

5 Unit test

Log how you did on your Student Progression Chart.

1 The graph shows the number of CD players owned by households in the UK, every 2 years from 2000 to 2012.
   a How many CD players were owned by households in the UK in
      i 2002
      ii 2008?
   b In which year did CD player ownership peak?
   c Estimate the number of CD players owned by households in the UK in 2011.

Number of CD players owned by households in the UK
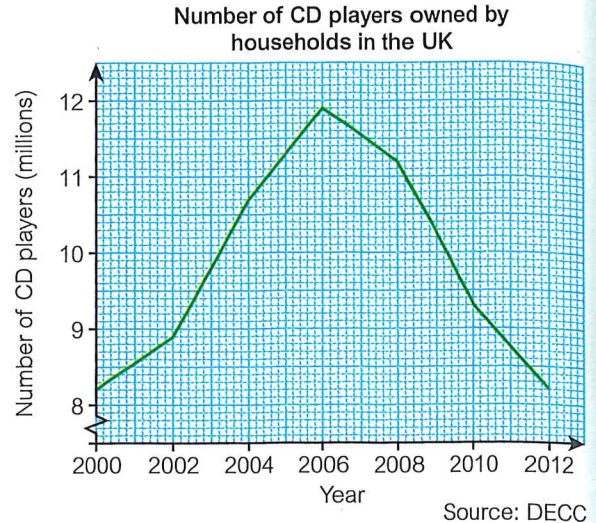
Source: DECC

2 The table shows the average temperature inside a centrally heated home, every 10 years from 1970 to 2010.

| Year	1970	1980	1990	2000	2010
Inside temperature (°C)	13.7	14.4	16.7	18.0	16.9

Source: DECC
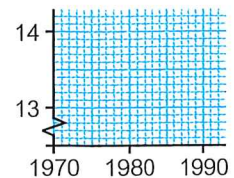
   a Draw and complete the line graph of this data.
   b Describe the trend in the average temperature inside a centrally heated home.

3 One teaspoon has a capacity of 5 ml.
   a Copy and complete this table.

Teaspoons	0	1	2	5
ml	0			

Conversion of teaspoons to millilitres

   b Copy these axes onto graph paper.
   c Plot the points from the table on the graph and join them with a straight line.
   d Use your conversion graph to complete these conversions.
   i 3.5 teaspoons = ☐ ml
      ii 21 ml = ☐ teaspoons
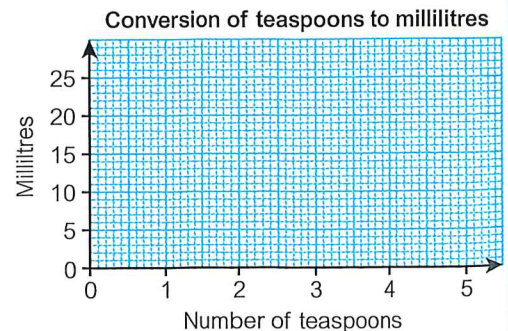
4 On Saturday, Raj walks from home to visit a friend. Later in the day he walks from his friend's house to collect his bike from the repair shop. He then cycles directly home.
   The graph shows Raj's journey.
   a At what time does Raj arrive at his friend's house?
   b How long does he stay at his friend's house?
   c How far does he walk from his friend's house to the repair shop?
   d On which part of the journey is Raj travelling fastest?

Raj's journey
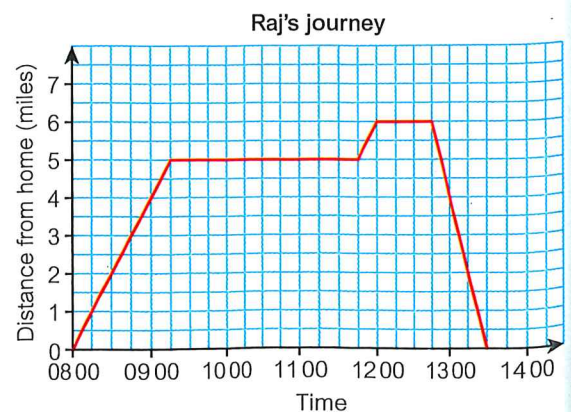
5 The graph shows the average mass of a kitten up to 15 weeks old.

  a What is the average mass of a kitten aged 7 weeks?

  b At what age does an average kitten reach a mass of 1 kg?

  c Sham has a kitten that is 9 weeks old. It has a mass of 750 g.
  Is its mass more or less than average?

  d During which 5-week period does a kitten's mass increase fastest?
  Explain how you can tell this from the graph.

Average mass of kitten
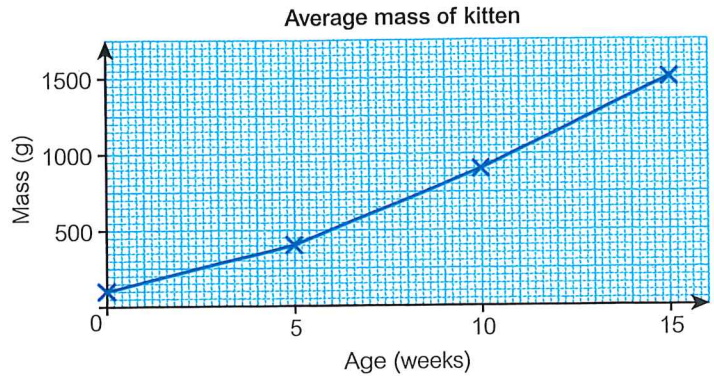
6 The graph shows the percentage change in the population of swallows and starlings in the UK from 1994.

  a Describe the trend in the swallow population in the UK.

  b What was the percentage increase in the swallow population in 2004?

  c What do you predict the percentage change will be in the swallow population by 2014?

  d Describe the trend in the starling population in the UK.

  e What was the percentage decrease in the starling population in 2012?

 **f** What do you predict the percentage change will be in the starling population by 2014?

Percentage change in UK swallow and starling population
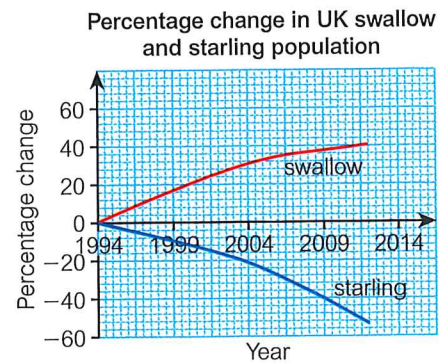
7 Annie goes to a meeting by car.
The distance–time graph shows her journey.

  a How long did Annie's meeting last?

  b Which was the fastest part of Annie's journey?

  c What was Annie's speed

   i from the office to the meeting

   **ii** from the meeting back to the office?

Annie's journey
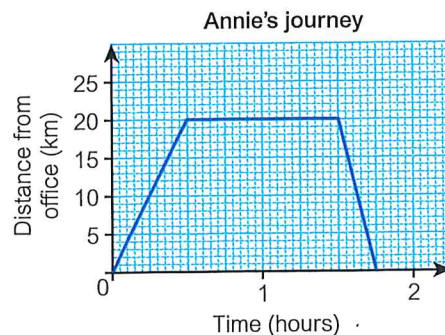
Challenge

8 The graph shows the height above the ground of a rollercoaster over time. Write a description of the ride for a marketing brochure.

Rollercoaster height
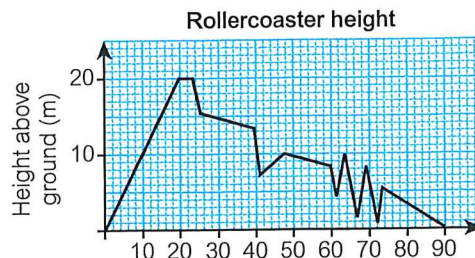
> **Q8 hint**
>
> You can include in your description the different sections of the ride, e.g. fastest section, highest section, scariest section, steepest section ...

9 **Reflect** Look carefully at the numbers and words used in this unit test. Now copy and complete this spider diagram to show all the different areas of mathematics that you had to use in each question. Write a sentence about how much mathematics you know and can do.

decimals

time

estimation

Q1

Q2

Q3

Q4

Maths used in real-life graphs

Q5

Q7

Q6

Reflect
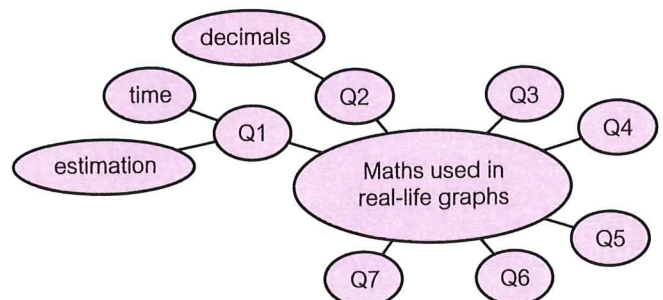
4 Unit test

Log how you did on your Student Progression Chart.

1 Solve these equations.

   a $t + 3 = 11$ **b** $\frac{y}{3} = 7$ **c** $-5a = 20$

2 The distance d m a cyclist has travelled after t seconds at a speed of s m/s is given by the formula $d = st$.
Find the value of t when $s = 4$ m/s and $d = 60$ m.

3 On a car journey, four people shared the cost £P of the petrol.
Write an expression for the amount each person paid.

4 Solve the equation $2d - 3 = 17$.

5 The price of a sweat band in SportsPlus is £t.
The price of the same sweat band in Jenco's is £1 more.
   a Write an expression for the total cost of four sweat bands from SportsPlus.
   b Write an expression with brackets for the total cost of three sweat bands from Jenco's.
   c Three sweat bands from Jenco's cost the same as four from SportsPlus. Solve an equation to find the price of a sweat band in SportsPlus.

6 Solve these equations.
   a $3(m - 2) = 9$ **b** $4r + 5 = 2r + 11$ **c** $2(b + 5) = 3b + 8$

7 Solve the equation $5(c - 2) = 2(c + 1)$.

8 Expand these expressions. Simplify where possible.
   a $c(2b + 5)$ **b** $3u(u + 1)$ **c** $-2(t - 3)$
   d $5(m + 2) - 3(m - 2)$ **e** $u(3u - 2) + 6u$ **f** $2(3a + b) - 2(a - b)$

9 Simplify these expressions.
   a $w^3 + w^3$ **b** $2h^2 + 3h^2 + 4h$ **c** $4a^2 + 5ab - a^2 - 3ab$

10 Expand $a(a^2 + a + 4)$.

11 A company logo is made using three squares of side a cm.
   a Write an expression for
      i the area of one square
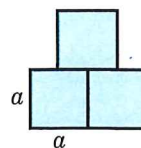   **ii** the total area of the logo.
   b Use your answer to part **a** to find the total area of the logo when $a = 4$ cm.
   c Write a formula for the total area A of a new logo made using
      i 4 squares   **ii** 5 squares   **iii** n squares.

12 **a** Write $c \times c \times c \times c \times c$ as a power.
   b Write m^4 as a product.
   c Write each product using index notation.
      i $p \times p \times t \times t \times t$ **ii** $5a \times 2a \times a$

13 Simplify these expressions.
   a $d^3 \times d^2$ **b** $c^6 \div c$ **c** $s^3 \times \frac{s^4}{s^2}$ **d** $(3c)^2$

14 a i Write the highest common factor of $8a$ and 16.

    ii Factorise completely $8a + 16$.

  b Factorise completely

    i $12s + 8t$ **ii** $4w^2 - 6w$ **iii** $6pe + 12pc - 9pt$

15 Solve these equations.

  a $\dfrac{x-2}{3} = 4$ **b** $\dfrac{g}{3} + 2 = 7$ **c** $\dfrac{2b}{5} = 6$ **d** $\dfrac{3h}{-2} = 9$

16 Solve these equations.

  a $\dfrac{4p+2}{5} = 10$ **b** $\dfrac{-2+3s}{5} = 5$ **c** $\dfrac{10-6x}{4} = 1$ **d** $\dfrac{9+t}{2} = 2t$

17 STEM The strength H of a magnetic field is given by the formula $H = \dfrac{nI}{L}$.

Use the formula to find I when $H = 1000$, $n = 100$ and $L = 0.2$.

18 36 sparklers are divided equally between n people.

  a Write an expression for the number of sparklers each person receives.

  b Each person receives two sparklers.

    Write an equation and solve it to find the number of people.

19 Problem-solving Two bottles of juice are mixed with 600 ml of fizzy water.
The mixture fills 10 glasses.

  a Write an expression for the volume a glass contains.

  b Each glass contains 300 ml.

  Solve an equation to find the volume of juice a bottle contains.

Challenge

20 Find numbers to complete the power pyramids.

  a For pyramid A, multiplying two adjacent powers on the same row gives the power above.

  b For pyramid B, dividing two adjacent powers on the same row gives the power below.

  c Use both rules to complete pyramid C.

  d Replace a^{13} in pyramid C with a higher power of your own and try again.
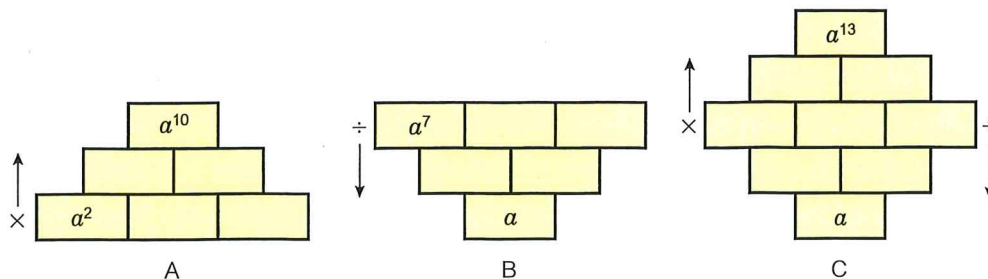
21 Reflect This may be the first time you have done any algebra since Year 7.

Choose A, B or C to complete each statement.

    In this unit, I did ..   **A** well   **B** OK   **C** not very well.

    I think algebra is ...   **A** easy   **B** OK   **C** difficult.

    When I think about doing algebra, I feel ... **A** confident   **B** OK   **C** unsure.

If you answered mostly As and Bs, are you surprised that you feel OK about algebra? Why?

If you answered mostly Cs, look back at the questions in the lessons that you found most tricky. Ask a friend or your teacher to explain them to you. Then complete the statements above again.

3 Unit test

Log how you did on your Student Progression Chart.

1 The pie chart shows the different birds seen in a garden one day.
   In total 72 birds were seen.
   How many of them were
   a starlings
   b sparrows
   c goldfinches?

Birds in a garden

2 A survey about shopping habits asked people how many items they had bought online that week.
   Here are the results.

Items bought online	Frequency
0	5
1	8
2	12
3	10
4	8
5	2

   a Work out the range
   b What is the mode?
   c Work out the mean. Give your answer to one decimal place.

3 The table shows the amounts two families spent on their weekly food shop over one year.

	Mean	Median	Range
Smith family	£85	£82.50	£38
Jones family	£75	£81	£24

   a Write two sentences comparing the amounts the two families spent on food.
   b Explain why there is unlikely to be a modal value for a family's weekly food shop.

4 Draw a pie chart to show the online shopping data in Q2.

5 Here are the prices of some mobile phones in one shop.
   £129.99, £118.95, £95.99, £92.50, £329.99
   a Work out the mean, median and mode. Give your answers to the nearest penny.
   b Which average best represents the prices of phones in the shop?

6 A chicken farmer recorded the mass of eggs laid one morning.
   58.5 g, 61.3 g, 55.2 g, 58.6 g, 49.1 g, 45.2 g, 64.7 g, 61.2 g, 55.0 g, 59.5 g
   Copy and complete the grouped frequency table for the data.

Mass, m (g)	Tally	Frequency
$45 \leqslant m < 50$		
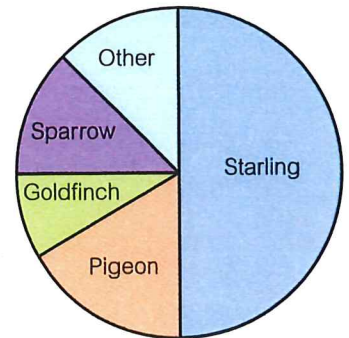
10 **STEM / Modelling** To test how a copper tank would expand in high temperatures in a power station, a copper bar 10 m long was heated. Its length was recorded at different temperatures. The results were plotted on this scatter graph.
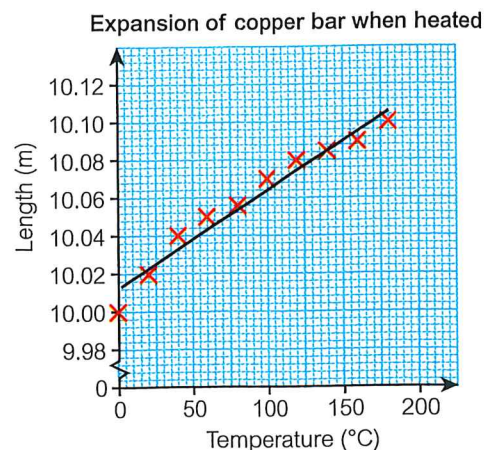
a Describe the correlation shown by the graph.

b What happens to the length of the copper bar as the temperature increases?

c Use the line of best fit to predict the length of the bar at
   i 20 °C   ii 110 °C.

d Using your answers from part **c**, estimate how much the bar would increase in length when heated from room temperature (20 °C) to 110 °C.

Expansion of copper bar when heated

11 **Modelling** Some Year 9 students took two English assessments – writing and comprehension.

Here are their results.

Student	A	B	C	D	E	F	G	H	I	J	K	L	M
Writing	64	59	78	82	42	76	43	absent	15	38	45	68	72
Comprehension	60	absent	72	88	36	80	49	85	27	37	51	65	76

a Draw a scatter graph for this data. Put writing marks on the horizontal axis and comprehension marks on the vertical axis.
Ignore the data for students B and H.

b Draw a line of best fit on your graph.

c Describe the relationship between the marks for writing and marks for comprehension.

d Use your line of best fit to predict the
   i comprehension marks for student B   ii writing marks for student H.

Investigation   **Problem-solving**

1 From this bar chart, which age group appears to have the most accidents?
Here is the original car accident data.

Age, a (years)	Frequency
$0 \leqslant a < 5$	21
$5 \leqslant a < 10$	23
$10 \leqslant a < 15$	48
$15 \leqslant a < 20$	327
$20 \leqslant a < 25$	332
$25 \leqslant a < 30$	241

Source: RAC Foundation 'Mortality statistics and road traffic accidents in the UK'

Annual deaths in car accidents

2 a Draw a bar chart to show this data.
Use a horizontal axis like this.

b From your bar chart, which age group appears to have the most accidents?

c Why is the first bar chart misleading?
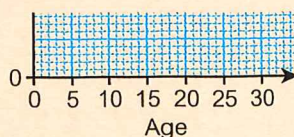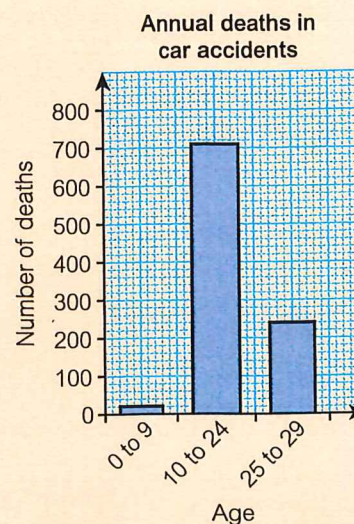
3 Design a poster showing people how to spot misleading graphs.

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12 **Reflect** Q6 uses data that climate scientists might use. It also uses these maths topics: line graphs, mean and range.
List all the other maths topics you have used in these Extend lessons.
How might climate scientists use these maths topics too?

Reflect

2 Unit test

Log how you did on your Student Progression Chart.
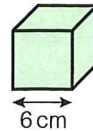
1 Work out these conversions.

   a 9 litres = ☐ cm³
   b 0.8 litres = ☐ cm³
   c 12 000 cm³ = ☐ litres
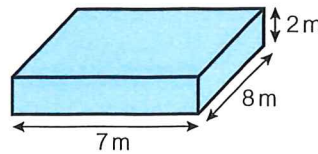   **d** 950 cm³ = ☐ litres

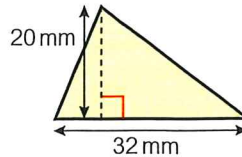2 The diagram shows a cube of side length 6 cm.
   Work out the surface area of the cube.
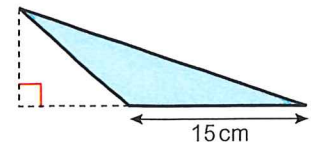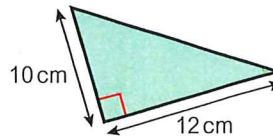
6 cm

3 Calculate the surface area of this cuboid.
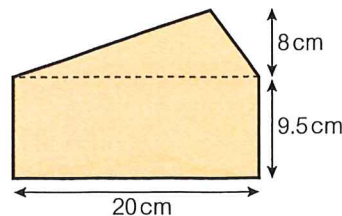
2 m
8 m
7 m

4 Work out the area of this triangle.

20 mm
32 mm

5 These two triangles have the same area.
   a Work out the area of the green triangle.
   b Work out the height of the blue triangle.

10 cm
12 cm
15 cm

6 Work out the area of this shape.

8 cm
9.5 cm
20 cm

7 Work out these conversions.

   a 8.5 cm² = ☐ mm²
   b 60 000 cm² = ☐ m²

8 Work out the area of each shape.
   a A parallelogram

8 cm
7 cm
15 cm
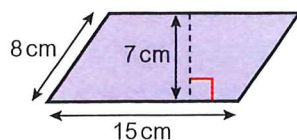
   b A trapezium.

8 mm
15 mm
20 mm
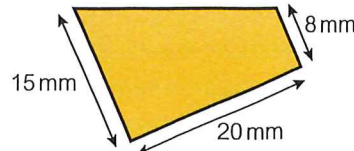
9 The diagram shows the dimensions of an eyeshadow box.
   What volume of eyeshadow does it hold? Give your answer in mm³.

5 mm
25 mm
42 mm
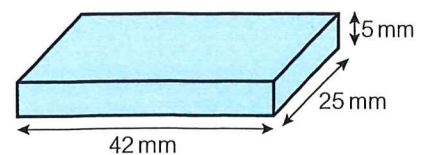
1 Unit test

1 The temperature in Moscow was −8 °C at 6 am and 2 °C at midday.
   a Work out the difference in temperature.
   b By midnight, the temperature had fallen by 14 °C compared to midday.
      i What was the temperature at midnight?
      ii What is the difference in temperature between 6 am and midnight?
   c Work out −4 − 6.

2 a Estimate the answer to 4.1 × 8.9.
   b One calculator costs £5.95. How many can you buy for £43?

3 Work out these.
   a −4 × 5 + 1   b 9^2 c $\sqrt{25}$ d 5^3
   e 2 × 5^2 f 13 + $\sqrt{49}$ g $\sqrt{4} + 9 \times 5$ h $\sqrt[3]{64}$

4 To make a tunnel, 17 220 tonnes of earth need removing.
   In the first week 455 tonnes were removed, in the second week 8200 tonnes
   were removed.
   Work out the amount of earth left to remove.

5 12 plates cost £30.60. How much does one plate cost?

6 a Work out these.
      i 5 × 14   ii 8 × 99   iii 2.5 × 36   iv 64 × 12.5
   b Work out 240 ÷ 15.

7 Work out 9 + 83.8 − 0.07.

8 Which two whole numbers does $\sqrt{67}$ lie between?

9 a Work out the highest common factor of 24 and 90.
   b Work out the lowest common multiple of 9 and 15.
   c A timer beeps every 12 seconds. Another timer beeps every 20 seconds.
      Dunstan hears the two timers beep at the same time.
      How long before they next beep at the same time?

10 a Estimate the area of a square of side length 6.2 cm.
    b Estimate the answer to each of these.
       i 2.9 × (178 − 99)   ii $\dfrac{79 + 57}{7.1}$

11 Write the value of each of these.
    a the two square roots of 36   b 70^2 c 2^4

12 Work out these.
    a 5 − − 8   b −3 × 8   c 16 ÷ −8   d 6 + 15 ÷ −3
    e $(-6)^2$ f $3^2 \times 2^3$ g $\sqrt[3]{1000} - \sqrt{121}$ h −10 × (7 − 12)

13 a i Work out the value of 2 × 2 × 2 × 3.
       ii Write 2 × 2 × 2 × 3 using index notation.
    b Write 90 as the product of its prime factors, using index notation.