Assessment Test 1

Pages 43-48

1) 6.775 km

Numbers from 6.775 up to (but not including) 6.785 round to 6.78 to 2 d.p. So the shortest possible distance is 6.775 km.

2) 239

```
      2 3 9  remainder 3
16 | 3 8 2 7
   - 3 2
     6 2
   - 4 8
     1 4 7
   - 1 4 4
         3
```

So 239 packs could be filled with 3 pencils left over.

3) D

Trapeziums can't have two pairs of equal sides. Squares, rhombuses and parallelograms have two pairs of equal angles. So it must be a kite.

4) 16 °C

The new temperature in the freezer is $-18 + 6 = -12$ °C. So the difference is $4 - -12 = 16$ °C.

5) 6

Work backwards to find the original number, doing the opposite operation each time. $84 \div 3 = 28$. $28 + 8 = 36$. The number that is multiplied by itself to get 36 is 6.

6) B

Add the three amounts together:

```
  1 9 5.8 0
  3 7 2.3 5
+ 1 0 4.4 0
  6 7 2.5 5
  1 1 1
```

Or you could have done this by estimating: Round each number to an easier one, then add, e.g. £200 + £370 + £100 = £670. The only option close to this is B.

7) 20 mm

$7200 = 30 \times 12 \times \text{width}$

$7200 = 360 \times \text{width}$

$7200 \div 360 = 20$, so the width is 20 mm.

8) 5000

$731 + 519 = 1250$, so they sold 1250 packs in total. $1250 \times 4 = 5000$, so they sold 5000 individual marbles.

9) (5, –2)

The known points are 8 units apart
Squares have 4 sides of equal length,
so the x-coordinate of A must be 8 units
to the right of the known x-coordinate.
So the x-coordinate of A is $-3 + 8 = 5$.
The y-coordinate of A is the same
as the y-coordinate of the point
directly to the left, which is -2.
So the coordinates of A are $(5, -2)$.

10) 161

'2 in every 7' is another way of writing $^2/_7$, so
$^2/_7$ of the animals are sheep. $^2/_7$ of the total
is 46, so $^1/_7$ of the total is $46 \div 2 = 23$. So
there are $23 \times 7 = 161$ animals on the farm.

11) 9607

Work out how many points Olivia
and Marcus have together:

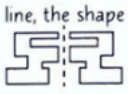
$$\begin{array}{r} 1\,1\,3\,8\,9 \\ +\quad 8\,5\,1\,6 \\ \hline 1\,9\,9\,0\,5 \\ \quad\;\; 1\;\;1 \end{array}$$

Then subtract this from the team high score.

$$\begin{array}{r} {}^{1}\not{2}\,{}^{1}\not{8}\,{}^{1}5\,{}^{0}\not{1}\,{}^{1}2 \\ -\,1\,9\,9\,0\,5 \\ \hline \quad 9\,6\,0\,7 \end{array}$$

12) B

After it is reflected in a
horizontal mirror line,
the shape looks like this:
Then when it has been
reflected in a vertical mirror
line, the shape looks like this:



13) 13

Write a few more terms for each sequence.
Joanna's sequence: ..., 13, 4, –5, –14, –23, –32,
–41, –50, –59, –68, –77, –86, –95, –104...
Piotr's sequence: ..., –25, –6, 13, 32, 51...
So 13 is in both sequences.

14) 22

There are $4\,^1/_2$ symbols in the 'tea' row
and 6 symbols in the 'coffee' row.
$4\,^1/_2 + 6 = 10\,^1/_2$, so $10\,^1/_2$ symbols represents
42 drinks. $4 \times 10\,^1/_2 = 42$, so each symbol
represents 4 drinks. There are $5\,^1/_2$ symbols
in the 'milkshake' row, so $5\,^1/_2 \times 4$
$= 22$ milkshakes were sold.

15) 54

When $n = 6$: $4 \times 6 - 3 = 21$
When $n = 9$: $4 \times 9 - 3 = 33$
So the sum is $21 + 33 = 54$.

16) A

$^6/_{25} = {}^{24}/_{100} = 24\%$ are blue.
So $100\% - 36\% - 24\% = 40\%$ are pink.
10% of $150 = 150 \div 10 = 15$,
so 40% of $150 = 4 \times 15 = 60$.

17) 80°

All of the angles inside a regular polygon
are equal, so the two angles around the
point with angle x are both 140°.
Angles around a point add up to 360°,
so angle $x = 360° - 140° - 140° = 80°$.

18) C
The numbers between 1 and 21 that are 1 less than a multiple of 3 are: 2, 5, 8, 11, 14, 17 and 20.
The numbers between 1 and 21 that are 1 more than a prime number are: 3, 4, 6, 8, 12, 14, 18 and 20.
8, 14 and 20 are on both lists, so there are three possible numbers.

19) 21 minutes
Mean = total time ÷ number of subjects (4). So to work out the total, multiply the mean by 4: 24 × 4 = 96 minutes.
31 + 17 + 27 = 75, so he spent 96 − 75 = 21 minutes on his history homework.

20) D
7 is the only option that 182 divides by exactly.

$$7\overline{)1^{1}8^{4}2}\quad 26$$

21) 36 cm
Work out how many pizzas were ordered. 2 pizzas would cost 2 × £6.50 = £13, so 8 pizzas cost £13 × 4 = £52.
There are 8 pizzas in the stack, so the stack is 8 × 4.5 = 36 cm tall.

22) A
Reading off the graph, the total rainfall during the morning was 36 mm.
36 ÷ 2 = 18 mm. Reading off the graph, 18 mm of rain had fallen by 08:30.

23) 3264
Each album can fit 24 × 8 photos:

$$\begin{array}{r} 24 \\ \times\ \ 8 \\ \hline 192 \\ {\scriptstyle 3} \end{array}$$

So 192 × 17 photos would fit in 17 albums:

$$\begin{array}{r} 192 \\ \times\ \ 17 \\ \hline 1344 \\ +\ 1920 \\ \hline 3264 \\ {\scriptstyle 1} \end{array}$$

24) 215 g
The total mass of the four potatoes is 4 × 245 = 980 g. The total mass of the three remaining potatoes is 3 × 255 = 765 g.
So the mass of the potato she ate was 980 − 765 = 215 g.

25) D
It can't be A or C, as the two crosses are next to each other on both nets. When nets B and E are folded, the squares will be next to each other and so will the circles.
So it must be D.

26) C
Convert the mass of the sack to grams: 12 kg = 12 × 1000 = 12 000 g.
3 small pots contain 3 × x = $3x$ grams.
5 large pots contain 5 × y = $5y$ grams.
So the amount left in the sack is given by the expression $12\,000 - 3x - 5y$.

27) 35
Pattern 1 has 3 toothpicks, Pattern 2 has 5 toothpicks and Pattern 3 has 7 toothpicks.
2 toothpicks are added each time, so Pattern 4 will have 9 toothpicks and Pattern 5 will have 11 toothpicks.
So she will need 3 + 5 + 7 + 9 + 11 = 35 toothpicks in total.

28) 5
Using BODMAS, $5 + 8 \times 2^2 = 5 + 8 \times 4$ = 5 + 32 = 37, so 7 × p must be less than 37.
35 is the largest multiple of 7 that is less than 37. 35 = 7 × 5, so the largest whole-number value of p is 5.

29) C
It will take him 57 ÷ 3 = 19 days to eat the sweets. Day 1 is a Wednesday, so Days 8 and 15 will also be Wednesdays.
So Day 19 will be a Sunday.

30) 1.05 litres
He needs to make 40 × 175 = 7000 ml of squash in total. 7000 ml ÷ 1000 = 7 litres.
150 ml of concentrate makes 1 litre of squash, so he needs 7 × 150 = 1050 ml of concentrate.
1050 ml = 1050 ÷ 1000 = 1.05 litres.

31) 12 cm
The area of the triangle is $\frac{1}{2} \times 4 \times h = 2h$.
The area of the rectangle is 8 × 3 = 24 cm².
They have the same area, so $2h$ = 24.
So h = 24 ÷ 2 = 12 cm.

32) B
A: 6 + 3 × 8 ÷ 2 = 6 + 24 ÷ 2 = 6 + 12 = 18
B: 6 × 3 + 8 ÷ 2 = 18 + 4 = 22
C: 6 − 3 + 8 × 2 = 6 − 3 + 16 = 19
D: 6 + 3 + 8 ÷ 2 = 6 + 3 + 4 = 13
E: 6 ÷ 3 + 8 × 2 = 2 + 16 = 18
So B has the largest value.

33) E
96 is 4 times 24, and 27 is 1.5 times 18, so you need to work out 432 × 4 × 1.5.
4 × 1.5 = 6, so 432 × 6 is the answer.

34) (10, 4)
The point at (−1, 5) is now at (3, 2), so the shape has been translated 4 units to the right and 3 units down. So the coordinates of P are (6 + 4, 7 − 3) = (10, 4).

35) D
The three acts last 3 × 55 = 165 minutes, so (including the breaks) the ballet lasts 165 + 15 + 35 = 215 minutes = 3 hours 35 minutes. 18:50 + 3 hours = 21:50, 21:50 + 35 minutes = 22:25.

36) 165
295 tickets were sold in total, so they sold 295 − 79 − 101 = 115 family passes.
115 − 53 = 62 family passes were sold on Saturday, so this is 62 × 2 = 124 adults.
79 − 38 = 41 individual adult tickets were also sold on Saturday, so 124 + 41 = 165 adults had tickets to the theme park on Saturday.

37) 14
3.75 kg = 3.75 × 1000 = 3750 g and 1.3 kg = 1.3 × 1000 = 1300 g. So she makes 3750 + 750 + 1300 = 5800 g of smoothie. 5800 ÷ 400 = 58 ÷ 4 = 14.5, so she can fill 14 jars of smoothie.

38) E
His appointment will finish at 1:45 pm.
The hospital bus stop is 5 minutes away, so he will get there at 1:50 pm (13:50).
So the earliest bus he can catch is the 14:24. This arrives at the Market Street stop at 15:26. So the earliest he can get home is 15:26 + 12 minutes = 15:38 = 3:38 pm.

39) C
9 + 5 + 3 + 8 = 25 prizes were won in total.
Ayo won 5 prizes and Wren won 8.
5 + 8 = 13, so $^{13}/_{25}$ prizes were won by either Ayo or Wren. $^{13}/_{25} = {}^{52}/_{100} = 52\%$

40) 8 cm³
There are 6 square faces on a cube. They are all identical, so each face has an area of 24 ÷ 6 = 4 cm². That means each cube has a side length of 2 cm, so the volume of the cube is 2 × 2 × 2 = 8 cm³.

41) £73
10% of £320 = £320 ÷ 10 = £32
5% of £320 = £32 ÷ 2 = £16
So 15% of £320 = £32 + £16 = £48, so the standard holiday costs £320 − £48 = £272.
25% of £460 = £460 ÷ 4 = £115, so the luxury holiday costs £460 − £115 = £345. So the difference in cost is £345 − £272 = £73.

42) 13
$(5^2 + 7 \times 2) \div (20 \div 4 - 2)$
= (25 + 7 × 2) ÷ (20 ÷ 4 − 2)
= (25 + 14) ÷ (5 − 2) = 39 ÷ 3 = 13

43) 3
84° represents 7 pupils, so 1 pupil is represented by 84° ÷ 7 = 12°. Angles in a pie chart add up to 360°, so the 'winter' angle is 360° − 132° − 108° − 84° = 36°.
36° ÷ 12° = 3 pupils have birthdays in winter.

44) E
$1\frac{3}{4} = \frac{4}{4} + \frac{3}{4} = \frac{7}{4}$. Quinn drank $\frac{7}{4} \times \frac{1}{4} = \frac{7}{16}$ litres. So there is $\frac{7}{4} - \frac{7}{16} = \frac{28}{16} - \frac{7}{16} = \frac{21}{16} = 1\frac{5}{16}$ litres left in the bottle.

45) £250
Paul gets 5 parts of the ratio and Lola gets 3 parts, so £50 is 5 − 3 = 2 parts.
So 1 part is £50 ÷ 2 = £25. There are 3 + 5 + 2 = 10 parts in total, so they won £25 × 10 = £250 in total.

46) B
$\frac{1}{4}$ of 80 cm = 80 ÷ 4 = 20 cm, so he only puts one layer of cubes in the crate. He can fit 260 ÷ 20 = 13 cubes along its length and 140 ÷ 20 = 7 cubes along its width.
So he puts 13 × 7 × 1 = 91 cubes in the crate.

47) D
Area of rectangle = 15 × 20 = 300 cm²
Area of left triangle = $\frac{1}{2} \times 16 \times (15 - 4)$
= $\frac{1}{2} \times 16 \times 11$ = 88 cm²
Area of right triangle = $\frac{1}{2} \times (20 - 16) \times 15$
= $\frac{1}{2} \times 4 \times 15$ = 30 cm²
So the area of the shaded region is 300 − 88 − 30 = 182 cm².

48) £112.50
She drives 224 + 136 = 360 km in total.
360 ÷ 8 = 45 and 45 × 5 = 225, so 360 km = 225 miles. So she gets 225 × £0.50 = £112.50 in expenses.

49) 66 cm

Area = length × width, so find two numbers that multiply to make 18, where one is double the other: 3 and 6. So the short sides of each rectangle are 3 cm long and the long sides are 6 cm long. There are 6 long sides and 10 short sides (half of a long side is the same as a short side) in the perimeter of the pattern, so the perimeter is 6 × 6 + 10 × 3 = 36 + 30 = 66 cm.

50) 228°

Angles in a quadrilateral add up to 360°, so the missing angle at the top is 360° − 75° − 72° − 129° = 84°.
Then look at the triangle. The missing angle at the bottom is also 66° as these angles are equal in an isosceles triangle. Angles in a triangle add up to 180°, so the missing angle at the top is 180° − 66° − 66° = 48°.
Angles around a point add up to 360°, so a = 360° − 84° − 48° = 228°.

Assessment Test 2

Pages 49-54

1) 3692 g

1 kg = 1000 g, so there are 1.34 × 1000 = 1340 g of sugar and 1.06 × 1000 = 1060 g of flour. Then add together to find the total weight:

$$\begin{array}{r} 1\,3\,4\,0 \\ \quad 4\,4\,5 \\ 1\,0\,6\,0 \\ +\quad 8\,4\,7 \\ \hline 3\,6\,9\,2 \\ {\scriptstyle 1\ 1\ 1} \end{array}$$

2) A

M = 1000, C = 100, L = 50, X = 10, V = 5 and I = 1. C is before M so CM = 1000 − 100 = 900.
XII = 10 + 1 + 1 = 12.
So CMXII = 900 + 12 = 912.
LXV = 50 + 10 + 5 = 65.
So CMLXV = 900 + 65 = 965.
965 − 912 = 53 years.

3) 3

The animals got 5 + 9 + 4 = 18 votes.
So the non-animals got 18 − 4 = 14 votes.
So 14 − 11 = 3 votes were for the tree.

4) C

Factors of 54: 1, 2, 3, 6, 9, 18, 27, 54
So 20, 30, 60 and 90 are all factors of 540. 40 is not a factor of 540.

5) E

They sold 5 + 3 = 8 yellow backpacks and 4 green backpacks. So 8 + 4 = 12 backpacks were sold and $^4/_{12}$ = $^1/_3$ of them were green.

6) £211.70

First, work out £365 × 58:

$$\begin{array}{r} 3\,6\,5 \\ \times\quad 5\,8 \\ \hline 2\,9_5\,2_4\,0 \\ +\,1\,8_3\,2_2\,5\,0 \\ \hline 2\,1\,1\,7\,0 \\ {\scriptstyle 1\ 1} \end{array}$$

£3.65 × 100 = £365, so £3.65 × 58 = £21 170 ÷ 100 = £211.70

7) 31

The number of people in each section is 3875 ÷ 25:

$$\begin{array}{r} \quad 1\,5\,5 \\ 25\overline{)\,3\,8\,7\,5} \\ -\,2\,5 \\ \hline \quad 1\,3\,7 \\ -\,1\,2\,5 \\ \hline \quad\quad 1\,2\,5 \\ -\,1\,2\,5 \\ \hline \quad\quad\quad 0 \end{array}$$

$^1/_5$ of the people in each section are in the front two rows, so 155 ÷ 5 = 31 people are in the front two rows of each section

8) E

The sum of the 6 temperatures is 20 + 15 + 21 + 18 + 16 + 17 = 107 °C.
The sum of the 5 temperatures she used to calculate the mean is 18 × 5 = 90 °C.
So the temperature she didn't use was 107 − 90 = 17 °C.

9) £1.17

The ice lollies cost 3 × £0.65 = £1.95 in total.
So the total cost of the items was £3.59 + £1.95 + £1.29 = £5.54 + £1.29 = £6.83. Maya had £8 − £6.83 = £1.17 left.

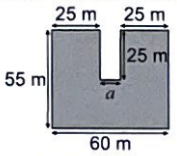
10) 6 429 654

The largest number that can be made using all of the digit cards is 8 766 332 and the smallest number is 2 336 678.

$$\begin{array}{r} {\scriptstyle 5\ 1\ 5\ 1\ 2\ 1\ 2\ 1} \\ 8\,7\,\not{6}\,\not{6}\,\not{3}\,\not{3}\,2 \\ -\,2\,3\,3\,6\,6\,7\,8 \\ \hline 6\,4\,2\,9\,6\,5\,4 \end{array}$$

11) D

First find the missing length:

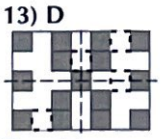


a = 60 − 25 − 25 = 10 m.
The perimeter of the field is 55 + 25 + 25 + 10 + 25 + 25 + 55 + 60 = 280 m. 280 ÷ 50 = 28 ÷ 5 = 5.6, so Jack will need to buy 6 rolls of wire fence.

12) 3 hours 10 minutes

The Farm Animals talk finished at 13:20, so Rex arrived at 13:20 − 25 minutes = 12:55.
The Reptiles talk started at 15:35, so Rex left at 15:35 + 30 minutes = 16:05.
Add 5 minutes to 12:55 to get to 13:00, then add 3 hours to get to 16:00 and add 5 minutes to get to 16:05. Rex was at the zoo for 5 minutes + 3 hours + 5 minutes = 3 hours 10 minutes.

13) D



The minimum number of tiles she could have removed was 4.

14) 7.5 cm

m is 1.25 times longer than the 6 cm side on shape X, so m = 6 × 1.25 = (6 × 1) + (6 × 0.25) = 6 + 1.5 = 7.5 cm.

15) 196 g

6.86 kg = 6860 g, so the average weight per pear is 6860 ÷ 35:

$$\begin{array}{r} \quad 1\,9\,6 \\ 35\overline{)\,6\,8\,6\,0} \\ -\,3\,5 \\ \hline \quad 3\,3\,6 \\ -\,3\,1\,5 \\ \hline \quad\quad 2\,1\,0 \\ -\,2\,1\,0 \\ \hline \quad\quad\quad 0 \end{array}$$

16) B

10% of 450 is 450 ÷ 10 = 45,
so 30% of 450 is 45 × 3 = 135. So the price in the sale is £450 − £135 = £315.
10% of 315 is 315 ÷ 10 = 31.5,
so 20% of 315 is 31.5 × 2 = 63.
So Omar pays £315 − £63 = £252

17) 9

The total sales from paperback books were £56.70 − £31.50 = £25.20.
The sales from non-fiction paperback books were £25.20 − £14.40 = £10.80.
So work out £10.80 ÷ £1.20:
£1.20 × 10 = £12, so
£1.20 × 9 = £12 − £1.20 = £10.80.
So they sold 9 non-fiction paperback books.

18) 60

A number in the shaded area must be a multiple of 4, 5 and 6.
Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60...
Multiples of 5: 5, 10, 15 ,20, 25, 30, 35, 40, 45, 50, 55, 60...
Multiples of 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60...
The first multiple that is in all three lists is 60.

19) 4 weeks

It will take her 8640 ÷ 360 = 864 ÷ 36 days to finish the house.

$$\begin{array}{r} \quad 2\,4 \\ 36\overline{)\,8\,6\,4} \\ -\,7\,2 \\ \hline \quad 1\,4\,4 \\ -\,1\,4\,4 \\ \hline \quad\quad 0 \end{array}$$

So it will take her 24 days. She works 6 days a week, so it will take her 24 ÷ 6 = 4 weeks.

20) 5.5 hours

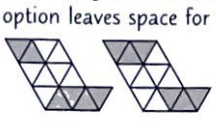
There are 360° in a full circle. The numbers on a clock face divide the circle into 12 equal sectors, so each sector has an angle of 360° ÷ 12 = 30°. There are 30° between each hour, so it takes 165° ÷ 30° = 5.5 hours.

21) 17

There are 360° in a circle, so the sector for rabbits is 360° − 60° − 85° − 170° = 45°.
45° represents 9 rabbits, so 1 pet is represented by 45° ÷ 9 = 5°. The sector for dogs is 85°, so they have 85° ÷ 5° = 17 dogs.

22) A

There are two ways that the first shape could fit in Shape A (as shown in the diagrams below), but neither option leaves space for the second shape.



23) E

There are 5 full pictures in Esmé's row, so she sold $12 \times 5 = 60$ cakes. Each wedge is $\frac{1}{6}$ of a full picture, so each represents $12 \div 6 = 2$ cakes. So Rae sold $12 + 2 = 14$ cakes. Taz sold $(2 \times 12) + (4 \times 2) = 24 + 8 = 32$ cakes. Together they sold $60 + 14 + 32 = 106$ cakes. The profit from each cake was £1.20 – £0.35 = £0.85. So they made $106 \times$ £0.85 = (100 × £0.85) + (6 × £0.85) = £85 + £5.10 = £90.10 profit in total.

24) £5.10

The minimum total amount they could have had is £13.50, as anything less than that would round down to £13 to the nearest pound. So the minimum amount Tamsin could have had is £13.50 – £8.40 = £5.10.

25) 695

Work out the expression for the nth term. The sequence increases by 7 each time, and the first term is 2, so the nth term is $7n - 5$. Substitute $n = 100$ to find the value of the 100th term: $(7 \times 100) - 5 = 695$.

26) £54

$32 \div 8 = 4$ and $4 \times 5 = 20$, so she walks 20 miles. She walks $20 \times 2 = 40$ half miles, so she will raise £1.35 × 40 = £54.

27) E

If the x-coordinate is –1 or 2, then the y-coordinate must be between –2 and 4. If the y-coordinate is –2 or 4, then the x-coordinate must be between –1 and 2. Point E is the only option that meets these criteria.

28) 240

The ratio of small to large bricks is 6:1. The ratio of small to medium-sized bricks is 2:1, so multiply both sides by 3 to match the number of parts for small bricks in the first ratio: $(2 \times 3):(1 \times 3) = 6:3$. So the ratio of small to medium-sized to large bricks is 6:3:1. There are $6 + 3 + 1 = 10$ parts in the ratio, so 1 part = $800 \div 10 = 80$. Medium-sized bricks take up 3 parts of the ratio, so there are $3 \times 80 = 240$ medium-sized bricks.

29) C

A: $(9 - 6) \times 4 \times 2^3 = 3 \times 4 \times 2^3 = 3 \times 4 \times 8 = 12 \times 8 = 96$

B: $5 \times 3 + 9 \times (8 + 1) = 5 \times 3 + 9 \times 9 = 15 + 81 = 96$

C: $2^2 \times (17 + 6) = 2^2 \times 23 = 4 \times 23 = 92$

D: $18 \div 3 + 9 \times (4 + 6) = 18 \div 3 + 9 \times 10 = 6 + 90 = 96$

E: $12^2 - 3 \times 16 = 144 - 3 \times 16 = 144 - 48 = 96$

30) C

Pick an option and picture it rotated to see if it can become any of the other shapes. A, B, D and E are all rotations of each other, but C is a different shape (the row of three blocks at the front would need to be at the bottom, rather than the top, for it to match the other shapes).

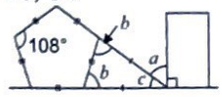
31) £64

In February he saved $\frac{4}{5}$ of £125. £125 ÷ 5 = £25, £25 × 4 = £100. In March he saved $\frac{4}{5}$ of £100. £100 ÷ 5 = £20, £20 × 4 = £80. In April he saved $\frac{4}{5}$ of £80. £80 ÷ 5 = £16, £16 × 4 = £64.

32) 3

$3n = 5^2 - (3 + 5) \times 2 = 5^2 - 8 \times 2 = 25 - 16 = 9$. So $n = 9 \div 3 = 3$.

33) 54°



All the angles inside the regular pentagon are equal, so they are all 108°. The triangle is isosceles, so the two angles labelled b here are equal. Angles on a straight line add up to 180°, so angle b is 180° – 108° = 72°. Angles in a triangle add up to 180°, so angle c is 180° – (72° × 2) = 36°. So $a = 180° - 90° - 36° = 54°$.

34) 64

The 5th term in the sequence is 32.5. To work out the previous terms you need to work backwards from the 5th term using opposite operations:
4th term: 32.5 – 24 = 8.5, 8.5 × 4 = 34.
3rd term: 34 – 24 = 10, 10 × 4 = 40.
2nd term: 40 – 24 = 16, 16 × 4 = 64.

35) B

The fraction of items sold that weren't pens was $\frac{1}{4} + \frac{3}{20} + \frac{1}{5} = \frac{5}{20} + \frac{3}{20} + \frac{4}{20} = \frac{12}{20} = \frac{3}{5}$. So $1 - \frac{3}{5} = \frac{2}{5}$ of the items sold were pens. $\frac{1}{5}$ of 460 is $460 \div 5 = 92$, so they sold $92 \times 2 = 184$ pens.

36) 8

800 g = 0.8 kg. The weight of 15 jumpers is $0.8 \times 15 = 12$ kg. The rail can still hold 45 – 12 = 33 kg more weight. $33 \div 4 = 8$ remainder 1, so it can still hold up to 8 coats.

37) 5 cm

The area of the shaded triangle is $\frac{1}{2} \times 10 \times 35 = 5 \times 35 = 175$ cm^2. The area of the square is $b \times b = b^2$. So $b^2 = 200 - 175 = 25$. So $b = 5$ cm.

38) 1.55 litres

One quarter of an hour = 15 minutes, so the bucket leaks for $2 \times 60 + 15 = 120 + 15 = 135$ minutes. So $30 \times 135 = 4050$ ml = 4.05 litres leaks out in total. The amount of water left in the bucket is 5.6 – 4.05 = 1.55 litres.

39) 4

Substitute $C = 70.5$ and $b = 3$ into the formula and solve for f:
$70.5 = 2f + 12.5 \times 3 + 25$
$70.5 = 2f + 37.5 + 25$
$70.5 = 2f + 62.5$, so $2f = 8$ and $f = 4$.
So there are 4 flowers in the box.

40) B

Each of them has 50% of the total area to paint. Archie has painted $\frac{7}{25}$ of 50% = (50 ÷ 25) × 7 = 14% of the total area. Sonam has painted $\frac{3}{5}$ of 50% = (50 ÷ 5) × 3 = 30% of the total area. So they have 100% – 14% – 30% = 56% of the total area left to paint.

41) 720 cm^3

The volume of 1 cuboid is $2 \times 4 \times 10 = 8 \times 10 = 80$ cm^3. There are 9 cuboids in the model, so the total volume is $80 \times 9 = 720$ cm^3.

42) 80 cm^2

Because it is made from 2 cm squares, the quadrilateral must be either a rectangle or a square and must have side lengths that are an even number of centimetres. The length and width will add up to half the perimeter, which is $36 \div 2 = 18$ cm. So the possible areas of the quadrilateral are:
$2 \times 16 = 32$ cm^2 $\quad 4 \times 14 = 56$ cm^2
$6 \times 12 = 72$ cm^2 $\quad 8 \times 10 = 80$ cm^2
So the largest possible area is 80 cm^2.

43) 15°

The angles inside a rectangle all equal 90°. Angles around a point add up to 360°, so the angle at the top left of the hexagon is 360° – 150° – 90° = 120°. The angles inside a regular hexagon are all equal, so they all equal 120°. The angles inside a regular octagon are all equal, so they all equal 135°. So $a = 135° - 120° = 15°$.

44) D

The dog weighs $3\frac{3}{4} \times 4\frac{2}{3} = \frac{15}{4} \times \frac{14}{3} = \frac{210}{12} = 17\frac{6}{12} = 17\frac{1}{2}$ kg.

45) 4650 minutes

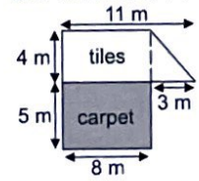
12:30 to 13:10 is 40 minutes. Add 15 minutes to 15:45 to get to 16:00, then add 1 hour = 60 minutes to get to 17:00 and add 35 minutes to get to 17:35. So 15:45 to 17:35 is 15 + 60 + 35 = 110 minutes. So he read for 40 + 110 = 150 minutes every day. There are 31 days in July, so he read for $31 \times 150 = 4650$ minutes in total.

46) E

$20 \div 5 = 4$, so 4 cubes can fit along the width. $28 \div 5 = 5$ remainder 3, so 5 cubes can fit along the length. $12 \div 5 = 2$ remainder 2, so 2 cubes can fit within the height. The box can fit $4 \times 5 \times 2 = 40$ cubes. The volume of one cube is $5 \times 5 \times 5 = 125$ cm^3, so the volume of 40 cubes is $40 \times 125 = 5000$ cm^3. The volume of the box is $20 \times 28 \times 12 = 560 \times 12 = 6720$ cm^3. The space left inside the box is $6720 - 5000 = 1720$ cm^3.

47) £1400

Split the area into rectangles and triangles and work out the missing length:



Area of a rectangle = length × width.
Area of a triangle = $\frac{1}{2}$ × base × height.
Tiles: The rectangular area is $4 \times 8 = 32$ m^2. Triangular area is $\frac{1}{2} \times 4 \times 3 = 2 \times 3 = 6$ m^2. The total tile area is $32 + 6 = 38$ m^2. So the total cost of the tiles is $38 \times$ £20 = £760.
Carpet: $8 \times 5 = 40$ m^2. So the total cost of the carpet is $40 \times$ £16 = £640. In total the floors will cost £760 + £640 = £1400.

48) D

$2 \times (32 \_ 8 + 4^2) = 10 + 5 \times 6 = 10 + 30 = 40$ So $32 \_ 8 + 4^2 = 40 \div 2 = 20$

$32 \_ 8 + 16 = 20$, so $32 \_ 8 = 20 - 16 = 4$

Try each sign until you find the one that works. $32 \div 8 = 4$

49) (7, –4)

The y-coordinate of A is 4, so the y-coordinate of C must also be 4.

The horizontal distance between points A and B is $4 - 1 = 3$. So the horizontal distance between B and C must also be 3.

So the coordinates of C are $(4 + 3, 4) = (7, 4)$. The reflected point C will be 4 units below the x-axis, so the reflected coordinates will be (7, –4)

50) 10 cm

First, work out the volume that is needed to fill the deep end of the tank up to the height of the ledge. This volume is $40 \times 50 \times 20 = 40\,000$ cm^3. The amount of water left is $200\,000 - 40\,000 = 160\,000$ cm^3.

This remaining water partially fills the tank above the level of the ledge, where the tank has length 80 cm and width 50 cm.

Volume = length × width × height, so:

height = volume ÷ (length × width)

$= 160\,000 \div (80 \times 50)$

$= 160\,000 \div 4000 = 40$ cm

This is the height from the shallow end, so the distance from the surface of the water to the top of the tank is $70 - (40 + 20) = 70 - 60 = 10$ cm

Assessment Test 3

Pages 55-60

1) 4.347

Halfway between 2 and 4 is 3.

Halfway between 7 and 1 is 4.

Halfway between 5 and 9 is 7.

So 4.347 is exactly halfway between 4.275 and 4.491.

2) 117°

Opposite angles in a parallelogram are equal, so the two smaller angles are both 63°.

Angles in a quadrilateral add to 360°, so the sum of the two larger angles is $360° - 63° - 63° = 234°$.

So angle $k = 234° \div 2 = 117°$.

3) B

Factors of 28: 1, 2, 4, 7, 14 and 28

Factors of 42: 1, 2, 3, 6, 7, 14, 21 and 42.

Common factors are 1, 2, 7 and 14, so two common factors (2 and 7) are prime.

4) £15.15

$$\begin{array}{r} 8.8\ 5 \\ 2.3\ 0 \\ 2\ 3\ 0 \\ +\ \ 1.7\ 0 \\ \hline 1\ 5.1\ 5 \\ \ \ 2 \end{array}$$

5) 41

There are $7 + 2 = 9$ rose and vanilla candles, so there are $9 \times 2 = 18$ lavender candles.

There are $7 + 14 + 18 + 2 = 41$ scented candles in the shop in total.

6) 3.35 kg

Add 7.86 kg and 13.79 kg

$$\begin{array}{r} 7\ 8\ 6 \\ +\ 1\ 3.7\ 9 \\ \hline 2\ 1\ 6\ 5 \\ 1\ 1\ 1 \end{array}$$

Then subtract this from 25 kg

$$\begin{array}{r} {}^{4}2\ {}^{9}\!\!\not{5}\ {}^{1}\!\not{0}\ 0 \\ -\ 2\ 1\ 6\ 5 \\ \hline 3\ 3\ 5 \end{array}$$

7) 10

Emile: $\frac{1}{8}$ of $48 = 48 \div 8 = 6$, so $\frac{3}{8}$ of $48 = 3 \times 6 = 18$.

Samira: $\frac{1}{12}$ of $48 = 48 \div 12 = 4$, so $\frac{5}{12}$ of $48 = 5 \times 4 = 20$

They ate $18 + 20 = 38$ mints, so there are $48 - 38 = 10$ mints left over.

8) D

$$\begin{array}{r} \ \ 1\ 2 \text{ remainder } 3 \\ 14 \overline{)\ 1\ 7\ 1} \\ -\ 1\ 4 \\ \hline \ \ 3\ 1 \\ -\ 2\ 8 \\ \hline \ \ \ 3 \end{array}$$

9) 21

E.g. $46 - 16 - 9 = 21$ pupils play football in total, so $21 - 14 = 7$ pupils from Class B play football. $16 - 5 = 11$ pupils from Class B are in the choir. So there are $11 + 7 + 3 = 21$ pupils in Class B. (You also could have found this by finding the number of pupils in Class A and subtracting this from 46.)

10) 227

$$\begin{array}{r} \ \ 2\ 2\ 6 \text{ remainder } 11 \\ 36 \overline{)\ 8\ 1\ 4\ 7} \\ -\ 7\ 2 \\ \hline \ \ 9\ 4 \\ -\ 7\ 2 \\ \hline \ \ 2\ 2\ 7 \\ -\ 2\ 1\ 6 \\ \hline \ \ \ 1\ 1 \end{array}$$

So she needs 227 packs.

11) E

She arrives 10 minutes before 10:05, which is 09:55. She leaves 15 minutes after 13:55, which is 14:10. 9:55 + 5 minutes = 10:00, 10:00 + 4 hours = 14:00, 14:00 = 10 minutes = 14:10, so she spends 5 minutes + 4 hours + 10 minutes = 4 hours 15 minutes at the dance school.

12) 18 000

$217 + 183 = 400$, so this is the same as 400×45. $4 \times 45 = 180$, so $400 \times 45 = 18\,000$

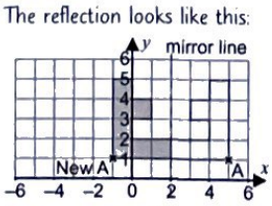
13) 64 mm

1.45 m = $1.45 \times 100 = 145$ cm.

$145 - 39 - 74 = 32$ cm. $32 \div 5 = 6.4$ cm, so each piece is 6.4 cm = $6.4 \times 10 = 64$ mm.

14) C

The reflection looks like this:



So the new coordinates of A are (–1, 1).

15) £238

Put $n = 4$ into the formula

$C = 52 \times 4 + 30 = 208 + 30 = 238$

16) A

Estimate the answer to each calculation

A. $400 \times 7 = 2800$

B. $4 \times 70 = 280$

C. $04 \times 70\,000 = 28\,000$

D. $40 \times 07 = 28$

E. $400 \times 700 = 280\,000$

The order would be D, B, A, C, E, so A would be in the middle.

17) 31

'3 in every 7' is the same as $\frac{3}{7}$.

$\frac{1}{7} \times 84 = 12$, so $\frac{3}{7}$ of $84 = 3 \times 12 = 36$

So $84 - 36 - 17 = 31$ are buses.

18) C

When this net is folded, the sides of the triangular faces won't match up with the sides of the rectangular faces.

19) B

Convert all times to minutes and seconds.

132 seconds = 2 minutes 12 seconds

Add the minutes: $2 + 2 + 3 = 7$ minutes

Add the seconds: $53 + 12 + 46 = 111$ seconds = 1 minute 51 seconds

So she takes 7 minutes + 1 minute 51 seconds = 8 minutes 51 seconds in total.

20) 176 cm

The sides of the pattern are sides of the heptagons, so each side length is $56 \div 7 = 8$ cm. The outside of the shape is made up of 22 of these side lengths, so the perimeter of the shape is $22 \times 8 = 176$ cm.

21) E

First few cube numbers: 1, 8, 27, 64...

Cube numbers + 14: 15, 22, 41, 78...

First few square numbers:

1, 4, 9, 16, 25, 36, 49, 64, 81...

Square numbers – 8:

–7, –4, 1, 8, 17, 28, 41, 56, 73...

41 is in both lists, so this is Amir's number.

22) B

Work out 17^2:

$$\begin{array}{r} \ \ 1\ 7 \\ \times\ 1\ 7 \\ \hline 1\ 1\ {}_{4}9 \\ +\ 1\ 7\ 0 \\ \hline 2\ 8\ 9 \end{array}$$

So the only option that equals 360 is $71 + 17^2$.

23) 76p

Convert all of the prices to pence:

£1.05 = 105p, £1.28 = 128p

$105p + 66p + 47p + 128p + 34p = 380p$

$380 \div 5 = 76$, so the mean price is 76p.

24) 18 litres

0.9 kg = $0.9 \times 1000 = 900$ g

This is enough to make $900 \div 15 = 60$ lots of gravy. Each batch is 300 ml = $300 \div 1000 = 0.3$ litres, so it is enough to make $60 \times 0.3 = 18$ litres of gravy.

25) £63.75

A box has 25 times more balloons than a pack, so buying 250 balloons in packs would cost 25 × £3 = £75.
10% of £75 = £7.50
5% of £75 = £7.50 ÷ 2 = £3.75
15% of £75 = £7.50 + £3.75 = £11.25
So a box costs £75 − £11.25 = £63.75.

26) 33 354

981 is 3 × 327, and 34 is 2 × 17, so 981 × 34 is the same as 5559 × 6.

$$\begin{array}{r} 5\,5\,5\,9 \\ \times \qquad 6 \\ \hline 3\,3\,3\,5\,4 \\ {\scriptstyle 3\ 3\ 5} \end{array}$$

27) B

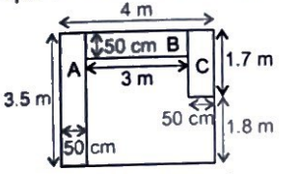
Write out the first few terms of the sequence: 4, 13, 31, 67, 139. So 139 is the first term greater than 100.

28) £4

Louis spent 120 × £1.50 = £180 making the pies. He made £300 profit, so he got £180 + £300 = £480 from selling the pies. So each pie sold for £480 ÷ 120 = £4.

29) 4.1 m²

Split the counters into three rectangles:



A = 3.5 × 0.5 = 1.75 m²
B = 3 × 0.5 = 1.5 m²
C = 1.7 × 0.5 = 0.85 m²
So the area of the kitchen counter is 1.75 + 1.5 + 0.85 = 4.1 m².
(Or, you could have subtracted the area of the white section from the area of the whole kitchen instead.)

30) 8.1 km

12.1 × 4 = 48.4, so she ran 48.4 km on the first four days. 11.3 × 5 = 56.5, so she ran 56.5 km in five days. So she ran 56.5 − 48.4 = 8.1 km on Friday.

31) 37°

Angles around a point add to 360°.
m + 9° + 4m − 19° + m + 13° + 3m + 24° = 360°, so 9m + 27° = 360°.
9m = 333° so m = 333° ÷ 9.

$$9\overline{)3\,3\,3}$$

So m = 37°

32) D

The numbers in the sequence increase by 3 each time, so 3n is part of the sequence. When n = 1, 3n = 3 × 1 = 3. But the first term is 5, so you need to add 2 to get the first term. So the nth term is 3n + 2.
(Check with the other terms. When n = 2: 3 × 2 + 2 = 8, which is the second term.)

33) C

She sold 12 + 24 + 18 + 36 + 26 + 34 = 150 figurines in total. 12 + 24 + 18 = 54 of these were sold between January and March. $^{54}/_{150} = {}^{18}/_{50} = {}^{9}/_{25}$.

34) £2.49

Each person spent the same amount of money, so they each spent £65.03 ÷ 7

$$7\overline{)6^{6}5^{2}0^{6}3}\quad 9\,2\,9$$

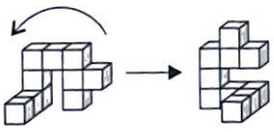
So a small popcorn costs £9.29 − £6.80:
£9.29 − £6 = £3.29, £3.29 − 80p = £2.49

35) 35°

The bottom-left triangle is right-angled as one of its angles is the angle in the rectangle.
Angles in a triangle add to 180°, so the other angle is 180° − 62° − 90° = 28°.
Angles on a straight line add to 180°, so the angle between the 28° and 55° angles is 180° − 28° − 55° = 97°.
Angles in a triangle add to 180°, so p = 180° − 97° − 48° = 35°.

36) E

Option E is the same shape, rotated 90° anticlockwise:



37) 1200°

11:45 am + 15 minutes = 12 pm,
12 pm + 3 hours = 3 pm,
3 pm + 5 minutes = 3:05 pm, so there is 3 hours 20 minutes between the times.
The minute hand moves through 360° in one hour, so it moves through 3 × 360° = 1080° in 3 hours. 20 minutes is $^{1}/_{3}$ of an hour, so the minute hand moves through 360° ÷ 3 = 120° in 20 minutes. So it moves through 1080° + 120° = 1200°.

38) £6

Work out how much she saves each week:
Week 5: £32 − £5.20 = £26.80
Week 4: £26.80 − £5.20 = £21.60
Week 3: £21.60 − £5.20 = £16.40
Week 2: £16.40 − £5.20 = £11.20
Week 1: £11.20 − £5.20 = £6

39) A

After watering his plants, there is $^{20}/_{20} - {}^{11}/_{20} = {}^{9}/_{20}$ left. Then he spills $^{2}/_{3}$ of this, so $^{1}/_{3}$ of it is still in the bucket.
So there is $^{9}/_{20} \times {}^{1}/_{3} = {}^{9}/_{60} = {}^{3}/_{20} = {}^{15}/_{100}$ = 15% still in the bucket.

40) 11

The width of each triangle is $^{1}/_{3}$ of the width of the rectangle. 13 − 1 = 12, so each triangle is 12 ÷ 3 = 4 units wide. The x-coordinate of Q is halfway across the third triangle, so it is 4 ÷ 2 = 2 units left of (13, 3).
So the x-coordinate of Q is 13 − 2 = 11.

41) 420

The mass of the 142 bricks is 1260 − 834 = 426 kg, so the mass of each brick is 426 ÷ 142 = 3 kg. So there were 1260 ÷ 3 = 420 bricks on the pallet originally.

42) D

First find 100 kroner in pounds. 100 kr isn't on the graph, so read off a different number instead, e.g. 50 kr, then scale up.
50 kr is approximately £6,
so 100 kr = 2 × £6 = £12.
Then use the other graph to find £12 in Swiss francs. £12 is approximately CHF 13.

43) 5

Put C = 25 and g = 3 into the formula
25 = 0.5 × 3 + 3.5r + 6
19 = 1.5 + 3.5r, so 3.5r = 17.5
r = 17.5 ÷ 3.5 = 5, so he went on 5 rides

44) 54 cm²

The missing side of triangle A is 24 − 6 − 8 = 10 cm. The triangles are similar, so the scale factor is 15 ÷ 10 = 1.5. So the other two sides of triangle B are 6 × 1.5 = 9 cm and 8 × 1.5 = 12 cm. So the area of triangle B is $^{1}/_{2}$ × 9 × 12 = 54 cm²

45) C

The ratio of red counters to blue counters is 1:4. The ratio of blue counters to green counters is 2:5. 2:5 = 4:10, so the ratio of red to blue to green counters is 1:4:10.

46) 6 cm

Work out the volume of the large cuboid:
12 × 15 × 10 = 180 × 10 = 1800 cm³
Work out the volume of the small cuboid:
4 × 5 × w = 20w
1800 − 20w = 1680, so 20w = 120.
So w = 120 ÷ 20 = 6 cm.

47) 4 cm

Area of a triangle = $^{1}/_{2}$ × base × height.
Call the base b, then height = 4 × b = 4b, so area = $^{1}/_{2}$ × b × 4b = 2b^2
So 2b^2 = 32, so b^2 = 32 ÷ 2 = 16.
The number that when multiplied by itself gives 16 is 4, so the base is 4 cm long.

48) 8

Work out the mean height of the bars in 'blocks', e.g. Test 1 is 6 blocks tall. The sum of the bars in blocks is 6 + 4 + 7 + 5 + 8 = 30, so the mean height in blocks is 30 ÷ 5 = 6.
6 blocks represents 12, so each block is 12 ÷ 6 = 2. The Test 2 bar is 4 blocks tall, so he scored 2 × 4 = 8 in Test 2.

49) D

Her brother gets £60, which is 2 parts of the ratio, so 1 part of the ratio is £60 ÷ 2 = £30. There are 6 parts in total, so the sale price after the 10% fee is 6 × £20 = £180.
£180 is 100% − 10% = 90% of the sale price. 10% is £180 ÷ 9 = £20, so 100% is £20 × 10 = £200.
So the heirloom sold for £200.

50) 90

In Office 1, 'Walk' is 90°, which is $^{1}/_{4}$ of the pie chart. 12 is $^{1}/_{4}$ of the people in Office 1, so there are 12 × 4 = 48 people in Office 1.
'Train' is 120°, which is $^{1}/_{3}$ of the pie chart, so 48 ÷ 3 = 16 people in Office 1 travel by train.
16 people in Office 2 also travel by train, so 64° represents 16 people in Office 2.
So 64° ÷ 16 = 4° represents 1 person in Office 2. 360° ÷ 4° = 90, so there are 90 people in Office 2.