Fortrose Academy

Mathematics Department

CfE Levels 3/4

S2 Essential Skills

Homework Booklet

It is important that pupils establish a habit of regular practice to consolidate skills learned in class. This revision homework is best **restricted to three questions per night**. Full solutions are provided on our website. Pupils should mark their work each evening by referring to the solutions provided on-line, and to note the layout and rigour of the teacher solution. Pupils should complete all corrections. Shade question numbers in the checklist each night green, amber or red to monitor strengths and weaknesses, as shown:

S2 Maths Homework Checklist (Green/Amber/Red)

		1	2	3		1	2	3		1	2	3		1	2	3		1	2	3
1	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
2	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3

Pupils can refer back to red and orange shaded problems when revising for assessments.

Most questions do not require the use of a calculator.

Those that can be answered using a calculator are indicated by the symbol:

Name:

S2 Maths Homework Checklist (Green/Amber/Red)

| #	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
1	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
2	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
3	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
4	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
5	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
6	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
7	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
8	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
9	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
10	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
11	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
12	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
13	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
14	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
15	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
16	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
17	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
18	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
19	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
20	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
21	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
22	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
23	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
24	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
25	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
26	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
27	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3
28	A	1	2	3	B	1	2	3	C	1	2	3	D	1	2	3	E	1	2	3

Set 1

1A

1) Expand $3x(5x + 2)$

2) Estimate the answer to $5.92 \times 33 + (2.82 \times 4.8^2)$
3) On a numbered 8 sided dice what is P(3)?

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1B

1) Simplify $8d^2e \times 3de$
2) Solve the equation $3(3w - 1) - 11 = 40$
3) Calculate the mean, median, mode and range: 9, 10, 10, 10, 12, 16, 24

1C

1) Calculate $3\dfrac{3}{5} \times \dfrac{2}{3}$

2) Simplify $8a^2b \div 2a$
3) Copy and fill in the sizes of **all** missing angles.

118°
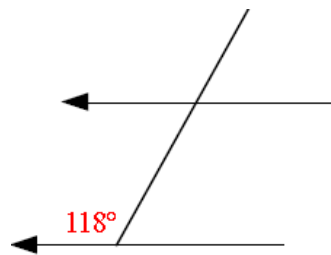
1D

1) Simplify $(3km)^3$

2) Solve the equation $4(p + 2) = 2(p + 6)$
3) What number is half way between 2.315 and 2.325

1E

1) Expand $7y(y^2 - z)$

2) Find 3.156×600

3) Meg uses $^7/_8$ of a bar of chocolate to make a cake and eats $^2/_3$ of the rest.

   What fraction of the bar is left?

Set 2

2A

1) Simplify $x^2 - 5y^2 + 3x^2 + 5y^2 - 4x^2$

2) Solve the inequation $-5x > 20$

3) Calculate the mean, median, mode and range:
   208, 107, 392, 115, 302, 208

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2B

1) Factorise $24x^2y - 40y^2$

2) Solve the inequation $2(8x + 1) < 3x + 2$

3) Calculate $7\frac{5}{6} + 3\frac{1}{3}$

2C

1) Calculate $3\frac{1}{2} + 4\frac{2}{7} + \frac{1}{28}$

2) Expand $-3a^2(2 - 5a^2)$

3) When the old farmer died, he left his land to his five daughters.

   Each daughter had three sons and each daughter gave $^1/_3$ of what she received to each of

   her sons. What fraction of the old farmer's land did each boy get?

2D

1) Simplify $(-5b^2) + (-11b^2)$

2) Solve $3(x - 1) - 2(1 - x) = 0$

3) Calculate $8\frac{2}{3} - 5\frac{1}{2}$

2E

1) If $x = -2$ and $y = 3$, find the value of $4x^2 - xy$

2) Solve the inequation $-36 < -5y$

3) The mean weight of two chairs is 14kg.

   If one of the chairs weighs 15.6kg what is the weight of the other?

Set 3

3A

1) Solve the inequation $7(2x - 1) \leq 12x$
2) Find $450 \div 500$

3) State the highest common factor of $27, 54, 63$

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3B

1) Calculate $3\frac{2}{5} \div 1\frac{3}{5}$

2) Three less than three times my number is the same as 25 take away my number.

   Form an equation and find my number.

3) Copy and fill in the sizes of **all** missing angles.
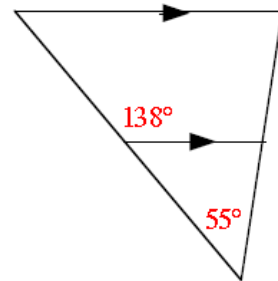
3C

1) If $a = -3$ and $b = 2$ find the value of $4a^2b$

2) Calculate $10\frac{1}{5} - 6\frac{1}{3}$

3) On a numbered 8 sided dice what is P(even)?

3D

1) Expand $-(9p - q)$

2) Calculate $\frac{2}{3} \, of \left(\frac{1}{4} - \frac{1}{5} \right)$

3) Find 45.7×76

3E

1) Solve $2(5x + 2) - 4(x - 3) = x + 36$

2) Calculate $\left(\frac{3}{4} + \frac{1}{7} \right) \times \frac{4}{5}$

3) Change 2hrs 20 mins to decimal time in hrs

Set 4

4A

1) Simplify 6 -3(2x – 3y) – (2 - 3x + y)

2) Calculate $8 \div 2\frac{2}{3}$

3) Copy and fill in all the missing angles

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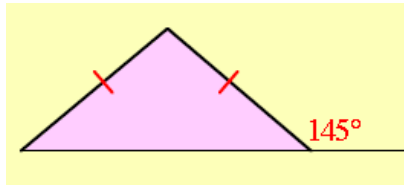
4B

1) Calculate $3\frac{1}{6} \times \frac{15}{19} \div \frac{1}{2}$

2) Simplify (–3mn) – (–8mn)

3) Calculate the size of the **exterior** angle of a regular a regular nonagon.

4C

1) Solve 4(x – 2) – x ≤ -(16 + x)

2) Calculate 0·02 x (–0·04)

3) The mean age of four pupils is 15 years old. If four of the pupil's ages are 13, 16, and 17, then what is the age of the fourth pupil?

4D

1) Factorise $24k^2h + 36kh^2$

2) Calculate $\left(3\frac{1}{2} + 2\frac{3}{4}\right) \times 1\frac{3}{5}$

3) On a numbered 8 sided dice what is P(prime)?

4E

1) Expand $12r(s^2 + r)$

2) If a = -3 and b = 2 find the value of 3b – 4a

3) Calculate the **mean**, **median**, **mode** and **range**: 11·0, 13·7, 1·7, 8·4, 9·9, 13·7.

Set 5

5A

1) Find $(-7ab)^2$

2) Find 0.605×0.048

3) The diameter of a brake disc manufactured should have a certain va
   fit a car wheel: diameter = (180 ± 25) mm.
   Which of the following are acceptable diameters:
   (a) 149mm (b) 203mm (c) 17.56cm (d) 20.6cm ?

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5B

1) Calculate $2\frac{2}{3} \div \frac{4}{9} - 3\frac{1}{7}$

2) If a = -3 and b = 2 find the value of $b(a - b)^2$

3) Three guards patrolling a boundary fence pass the check point every 4 minutes, 8 minutes
   & 12 minutes respectively. At 9am they all pass the check point together.
   At what time will they next pass the check point together?

5C

1) A man is 24 years older than his son. In 3 years' time, he will be 3 times as old as his son.

   Form an equation and solve it to find the age of the man and his son.

2) On a numbered 8 sided dice what is P(10)?

3) Find $\sqrt[2]{0.0049}$

5D

1) Expand $-w^2(vw + 1)$

2) A ten sided dice numbered 1 to 10 is thrown. Find P(square number).

3) Estimate the answer to $\dfrac{2.95 \times 5.1^3}{4.56}$

5E

1) Calculate $3\frac{5}{8} \div 1\frac{13}{16}$

2) Simplify $m \times n - 2m \times (-n)$

3) When a family of 7 visit gran, their mean age if 22. When gran is included in the group, the
   mean age of the eight then goes up to 29. How old must gran be?

By perseverance the snail reached the ark

Set 6

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6A

1) Simplify $5f^2g^2 \times 2f^2g^2$
2) Express 36 as a product of prime factors
3) Write 0.045 as a fraction in its lowest terms

6B

1) Evaluate the expression $2x^2 - 6x$ if $x = -3$

2) Find $(-2\cdot79) - (-7\cdot02)$

3) A tolerance is given as (……..+ 0.3)m. The maximum value allowed is 7.1m. What must the minimum value be?

6C

1) Calculate $\left(\dfrac{3}{4} - \dfrac{1}{6}\right) of \dfrac{6}{7}$

2) Expand $(13x - 5y)3y$

3) Using a scale of **1 cm represents 10m**, find the map length if the real length is 85m.

6D

1) Simplify $4x(3x - 2) - 3(3x - 4)$

2) Calculate the size of the smaller angle between the hands of a clock at 10 past 3.

3) Calculate $(-405) \div (-9000)$

6E

1) Simplify $8a^2b \div 2ab$

2) Express as a unit-less scale in its simplest form: map length of 5cm represents a real length of 50m
3) Copy and fill in the sizes of **all** missing angles.
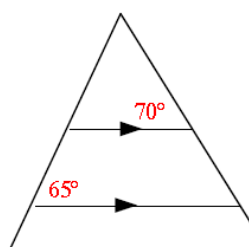
Set 7

7A

1) Simplify $y^2 - (2y)^2$

2) The bearing of A from B is 140°. What is the bearing of B from A?

3) Approximate the answer to 386062 × 0.007243

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7B

1) Expand $(a^2 + b^2)abc$

2) Flooring cost £12.80 / metre. How much would $1^5/_8$ m cost?

3) Today is October 5th. What was the date 3 weeks ago?

7C

1) Solve $3(2x - 3) - 2(1 - x) - (x + 1) = 0$

2) Convert 1 year 6 months into seconds

3) Copy and fill in all the missing angles
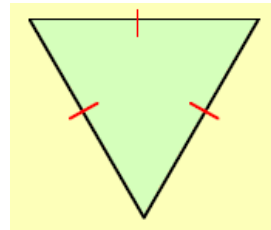
7D

1) Calculate $\left(\dfrac{4}{9} \div 1\dfrac{1}{3} + \dfrac{1}{5}\right) \times 1\dfrac{1}{4}$

2) Simplify $-3b^2 + 2b + 4 + b^2 - 2b + 4$

3) Sue stands 18m from a house and finds the angle from the ground to the top of the house (angle of elevation) to be 40°. Using a suitable scale, find the height of this building.

7E

1) I think of a number, multiply by 7, subtract 28 and find the result is 5 times the number I started with. Form an equation and solve it to find the number.

2) Caculate the size of the **interior** angles of a regular nonagon
3) Solve the inequation $-3x + 2 \geq 20$

Set 8

8A

1) Expand $(-5d^3 - e^2)e$

2) Change 48 mins to a decimal time in hrs

3) Find an estimate for $\left(\dfrac{19.4}{0.0437}\right)^2$

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8B

1) Calculate $\left(3\dfrac{3}{4} - 3\dfrac{1}{2}\right) \div \dfrac{7}{8}$

2) Simplify $3a^2b \times (-3ab)$

3) The mean price of two vacuum cleaners is £99.95.

   If one of the vacuums costs £89.55 what must the other one cost?

8C

1) Remove the brackets $4t(t^3 - 3t^2)$
2) Using a scale of **1 cm represents 500m**, find the map length if the real length is 2300m.
3) Round the following number to the number of decimal places indicated: 0·00605 (4dp)

8D

1) Calculate $\dfrac{2}{5} of \left(2\dfrac{3}{4} - \dfrac{7}{8}\right)$

2) Solve the inequation $3z + 34 > 10z - 14$

3) If I chose a card at random from a pack of cards, what is the probability that it will not be

   a face card?

8E

1) A rectangle has length $2x - 1$ cm and breadth 4 cm. Its area is 36cm². Calculate x.
2) Express as a unit-less scale in its simplest form: map length of 25mm represents a real
   length of 5km
3) What $68 \div [(5^3 - 127 + 3)^4 \times (2 \times (100 - 91 + 2^3))] \times (75 - (65 - 4^3)^9)$

Set 9

9A

1) Calculate $\left(4\dfrac{1}{5} \div \dfrac{7}{15}\right) \div \dfrac{3}{4}$

2) Simplify 50p : £3
3) Solve the inequation $15 - 4y < 12$

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9B

1) Expand $f^2g(3g - 2f)$

2) A ship on a bearing of 226° has to turn around and sail in the opposite direction.
   What would its new bearing be?
3) Copy and fill in the sizes of **all** missing angles.

72°   69°
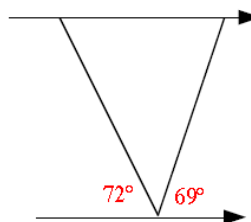
9C

1) Evaluate the expression $4A^3 + B(C - A)$ if A = -3, B = 5 and C = -2
2) Five pizzas cost £27.50. How much will 8 pizzas cost?
3) A life boat sails 16km from harbour on a bearing of 135°, then 20km on a bearing of 075°.

   Make a scale drawing to find the distance and bearing from the life-boat to the harbour.

9D

1) Simplify $(2mn)^4$

2) Round the following number to the number of decimal places indicated: 9·8124 (3dp)
3) Factorise $12t^2 + 18t^3 + 6t^4$

9E

1) Find $2^1/_5 \times {}^{15}/_{33} + 4^1/_5 \div {}^7/_8$

2) Simplify $^1/_4t^2 - s + {}^1/_2 + {}^1/_2t^2 - {}^1/_2s + {}^1/_4$

3) Write 2.4 hrs in hours and minutes

Set 10

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10A

1) It takes 12 workmen 3 hours to repair a roof.
   How long will it take 9 workmen, working at the same rate?
2) Calculate $\frac{2}{5}$ of $3\frac{1}{2} + \frac{4}{5}$

3) Find (-0.5) x (-120)

10B

1) Simplify $(-2a^2b)^2$

2) Using a scale of **1 : 1000**, find the map length if the real length is 86m.
3) The smallest of three consecutive numbers is m. If the sum of the three numbers is 225,

   form an equation in m and solve it to find m.

10C

1) Calculate $\left(\left(\frac{2}{3} \times \frac{1}{2}\right) \div \frac{3}{4}\right) \times 3$

2) Expand $(m^2 + 5n)km$

3) Express as a unit-less scale in its simplest form: map length of 4.2cm represents a real length of 420km

10D

1) The length of a rectangle is (21 + y) cm and its breadth is (3y + 5) cm.
   The perimeter of the rectangle is 84cm.
   Form an equation and solve it to help you calculate the area of the rectangle.
2) Simplify 1 hour : 35 mins
3) Write the compass direction SOUTH EAST as a bearing.

10E

1) Solve the equation 2 – 3(1 – x) = 2(x + 1)

2) Round the following number to the number of significant figures indicated: 32650·04 (3sf)
3) Make a scale drawing and find the height of the plane.

60°   42°

8 km
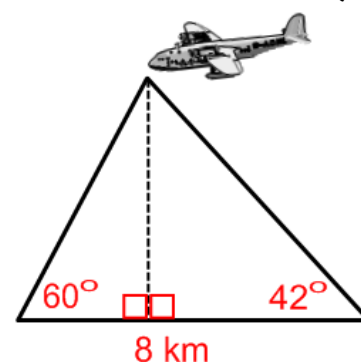
Set 11

11A

1) Simplify $ab + a^2b - 9ab + 5a^2b + b^2a$

2) Share £72000 in the ratio of 5:1

3) The probability of an event not happening is 0.45.
   What is the probability of the event happening?

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11B

1) Calculate $\left(5\frac{1}{2} \times \frac{1}{3} - \frac{1}{3} \right) \div \frac{9}{8}$

2) Round the following number to the number of significant figures indicated: 0·405784 (4sf)

3) The mean number of chocolates I counted in the first 3 of my Easter Eggs was 18.

   After opening the 4th egg, I discovered that the mean for all 4 was then 22.

   How many chocolates were in that last egg?

11C

1) Solve $3(2x + 7) = 2(5x - 3)$

2) A life boat sails 16 km SE from harbour, then 20 km on a bearing of 245^0.
   Make a scale drawing to find the distance and bearing of the harbour from the life boat

3) A fish farm has pike and tench in a 4 : 5 ratio.
   If there are 250 tench, how many pike are there?

11D

1) Expand $-8t^3(u - tu)$

2) In 24 hours the Earth turns about its axis through an angle of 360°.
   What angle has it turned through after 15 hours?

3) How many seconds are in November?

11E

1) Find $(-0.54) \div 0.3$

2) Write the compass direction NORTH WEST as a bearing.

3) A tolerance is given as (... $\pm$ 0.6) mm. The maximum value allowed is 32.4mm.
   What must the minimum value be?

Set 12

12A

1) Solve $2(x + 3) = 8 - 3(x - 4)$

2) Calculate 3% of 948

3) The ratio of diesel to petrol cars in a car park is 3 : 5.

   How many petrol cars are there if there are 27 diesel cars?

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12B

1) Convert 750 seconds into minutes and seconds.

2) Copy and fill in the sizes of **all** missing angles.

3) Express $^7/_9$ as a decimal
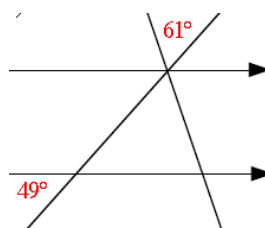
12C

1) Calculate $\left(1\frac{1}{3} + \frac{1}{2} + 1 \right) \times \frac{3}{11}$

2) Simplify $3(2x - y) - 2(y - 3x)$

3) Joe is making a fruit pudding on Scottish Master Chef. In the fruit pudding recipe the ratio of raspberries to blackberries is 5 : 1. Joe's fruit pudding must contain a total of 240 grams of fruit. Calculate the weight of raspberries in his pudding

12D

1) Solve $2(3(x + 1) - 8) = 20$

2) Using a scale of **1 : 100 000**, find the map length if the real length is 6km.

3) Round the following number to the number of significant figures indicated: 0·020487 (2sf)

12E

1) Simplify $4x^2 - 8y^2 - 3xy + 5xy - 2y^2$

2) Write $1\frac{7}{8}$ hrs in hours and minutes

3) From the top of the Eiffel Tower, Mark sees his friend Jeff on the ground at an angle of depression of 75°. Jeff is 80m from the foot of the tower. Using a scale of 1cm to 20m to make a scale drawing. Find the height of the Eiffel Tower to the nearest metre.

Set 13

13A

1) Calculate $9\frac{1}{4} \div (17\frac{1}{2} \text{ of } 10\frac{4}{7})$
2) Share £112000 in the ratio of 4:3
3) How long is it from 22:45 to 06:27

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13B

1) Simplify $10 + 4(x - 2y) - 2(2y - 3 + 3x)$

2) Covert 0.409 to a percentage
3) Simplify the ratio   0.5 : 1.25

13C

1) Using a scale of **1 : 10 000**, find the map length if the real length is 4.2cm.
2) A farmer has enough food to feed 300 cows for 20 days. If he buys 100 more cows, how long would the same amount of feed last?
3) Round the following number to the number of significant figures indicated: 2·987 (2sf)

13D

1) Calculate $9\frac{4}{5} - 3\frac{5}{6}$

2) In his Biology test Brian lost 3 marks, so scored 17 out of 20. In his Maths test he also lost 3 marks, scoring 22 out of 25. Brian thinks he did equally well in both subjects.
   Is he correct?
3) Find the total time of 2hrs 45 mins, 1 hr 50 mins, 3 hrs 25 mins, 1 hr 55 mins

13E

1) Solve $3(5(y - 1) + 2) = 36$

2) Find 0.6 x (-500) x (-0.4)

3) Simplify the ratio $2\frac{1}{2} : \frac{3}{5}$

Set 14

14A

1) Simplify $-9t(st - 5t^2)$

2) Convert $9m^2$ to cm^2
3) Change 68% to a fraction in its simplest form

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1) Calculate the area of the kite shown in the diagram.

2) A box contains a total of 30 red and blue marbles.
   The probability of picking a red at random is 40%.
   How many blue marbles are in the box?
3) Using a scale of **1 cm represents 20km**,
   find the real length if the map length is 7.5cm.

19cm

9cm
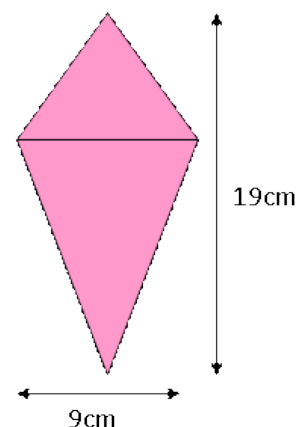
14C

1) $3(2(2p - 1) - 5) - 1 = 2$

2) A box of 50 apples costs £6.50. How much would you expect to pay for 12 apples?
3) Covert 0.026 to a percentage

14D

1) Calculate $\left(\dfrac{2}{3} + \dfrac{1}{2} \div 2\right) \times \dfrac{3}{5}$

2) Covert $^6/_{25}$ to a percentage
3) Bluebell sails 12km on a bearing of 070°, then 16km on a bearing of 160°. By making a scale

   drawing, find how far Bluebell is from its starting point and what bearing it should follow to

   return home.

14E

9.4cm

8.5cm

1) Simplify 75 cm : 2m
2) Calculate the area of the parallelogram shown.

3) What is the sum of the interior angles of an octagon?

13cm
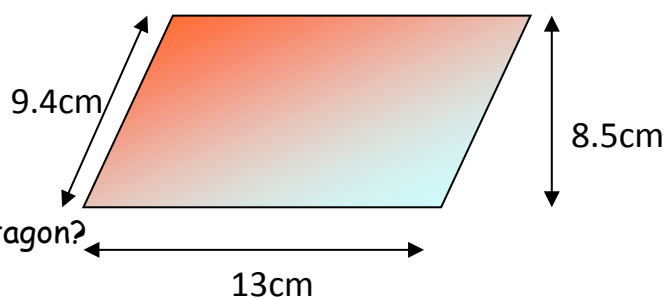
Set 15

15A

1) Find 62.5% of 78m

2) Solve $x(x + 4) = x^2 + 12$

3) Copy and fill in the sizes of **all** missing angles.

109°
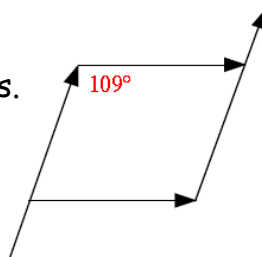
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Mathematics Department

15B

1) Calculate $3\frac{1}{2} + 4\frac{2}{7} - 1\frac{1}{28}$

2) Convert $2cm^2$ to m^2

3) Polly the parrot was bought for £80 and sold for £90. What is the percentage profit?

15C

1) Express as a unit-less scale in its simplest form: map length of 5cm represents a real length of 200km

2) A class contained 20 pupils. 8 pupils were girls. What % were boys?

3) Calculate the shaded area.

4cm

15cm
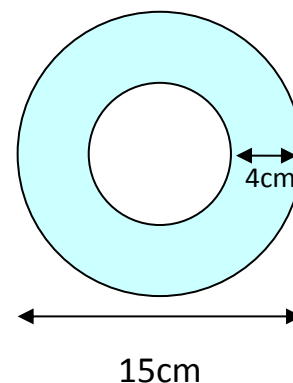
15D

1) If a = -5, b = -1 and c = -2, evaluate $b(a^3 + c^2 - 5ac)$

2) Two dozen chickens have enough feed to last a week. If three of the chickens are removed, how long will the feed last those chickens which are left?

3) Calculate the mean, median, mode and range:

-12, -9, -2, 3, -1, 4, 5, 8, -9, 3

15E

1) Change 16% to a fraction in its simplest form

2) Write the ratio **2 days: 2 weeks** in its simplest form

3) Calculate the diameter of a trundle wheel which measures 1m for each turn.

Set 16

16A

1) Simplify $(-8x^2) - (-8x^2)$

2) Calculate 65% of £32
3) Write the compass direction NORTH as a bearing.

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16B

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1) Share 1 litre in the ratio 3 : 1

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2) Convert 540mm^2 to cm^2
3) Calculate the **shaded area** of the following shape:
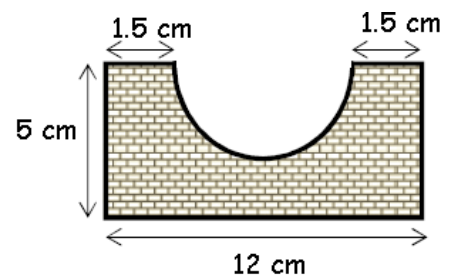
16C

1) Simplify $-x^2(2x^2 - 10x)$

2) Covert $^4/_9$ to a percentage
3) Find the radius of a circle with area 7.065 m^2

16D

1) Factorise $15a^2bc^2 + 12b^2c$

2) Using a scale of **1 mm represents 40m**, find the map length if the real length is 9mm.
3) Round the following number to the number of significant figures indicated: 32545252 (2sf)

16E

1) Calculate $1\frac{1}{3} + 2\frac{3}{5} - \frac{7}{10}$

2) From a weekly wage of £280, I pay £67.20 in rent.
   What percentage of my wage goes on rent?
3) Change $2\frac{1}{4}$ litres to cm^3

Set 17

17A

1) Simplify $x(x + 7) - 5x(x - 1)$

2) Find 400% of 41m

3) Calculate $2\frac{1}{3} + \frac{4}{7}$ of $1\frac{2}{5} \div \frac{1}{2}$

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Mathematics Department

17B

1) Simplify $- (-4x) - (-x)$

2) Convert 2468cm^2 to m^2

3) A ship sails 8 km on a bearing of 200° and then a further 9 km on a bearing of 100°.

   How far is the ship from its starting point. Scale drawing needed.

17C

1) $16abc \div (-4ab)$

2) A stack of 360 sheets of paper is 2.4 cm high. How high would a stack of 480 sheets be?

3) Gordon buys an antique teapot for £95. He sells it on an Internet auction site for £133. Calculate his percentage profit.

17D

1) Calculate $\dfrac{\frac{1}{2} of \frac{4}{5}}{2}$

2) Using a scale of **1 : 10 000 000**, find the map length if the real length is 3.9cm.

3) Change 500cm^3 to litres

8cm

19cm
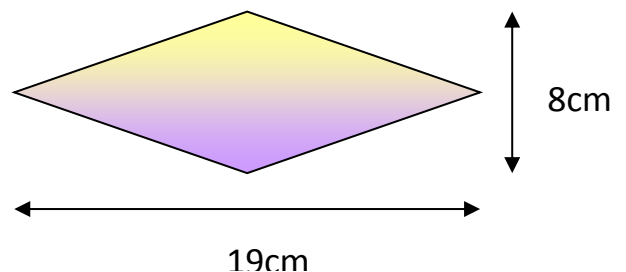
17E

1) Find the area of the shape shown in the diagram.

2) Write the ratio **1 seconds : 1 minute** in its simplest form

3) A trees circumference is measured to be 144cm. What is its radius.

Set 18

18A

1) Factorise $\frac{1}{5}ab + \frac{1}{5}bk$

2) Share £45000 in the ratio of 6:4:5

3) Covert $\frac{9}{40}$ to a percentage

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18B

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1) Calculate $1\frac{2}{3} - 1\frac{5}{6} + \frac{1}{2}$

2) A rectangular tank is 2 metres long, 1 metre broad and 0.5 metres deep.
   It is open at the top to collect rain water. How many litres of rain water can it hold?

3) At a school disco there were 12 teachers, 160 boys and 180 girls.

   In simplest form write the ratio of boys : total attended.

18C

1) A wedding invitation made up of a square and four semi-circles is to have gold ribbon around the outside. If 80 invitations are needed and the ribbon costs £0.78 per, metre, what is the total cost of the ribbon?

2) Simplify $3x(2x + y) - 5x(3x - y)$

3) Find 87.5% of 55mm
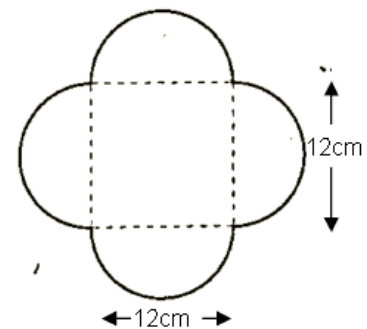
12cm

←12cm→

18D

1) Convert $87m^2$ to cm^2

2) Write the compass direction NORTH NORTH EAST as a bearing.

3) Find the diameter of a circle with area 0.785 m^2

18E

1) Simplify $3(2p + 3q - 4r + 2) - 5(p - 2q + 3r - 1)$

2) How many small boxes of dimensions 8 cm by 12 cm by 6 cm can fit in a larger box of dimensions 40cm by 60cm by 18cm.

3) A cylinder has a volume of $500cm^3$ and diameter of 20cm. Calculate its height.

Set 19

19A

1) Simplify $-m(7m^2 - 10m)$

2) A circular trampoline has a circumference of 10.99 m. Calculate the area, to the nearest m^2.

3) Calculate the perimeter of this shape

8 cm

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Mathematics Department
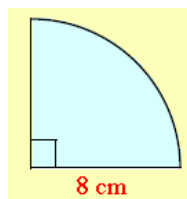
19B

1) Eleanor planted 40 sunflower seeds. 5 of the seeds failed to germinate.

   What percentage was this?

2) Convert $5cm^3$ to mm^3

3) A cylinder has volume of 750 ml and a height of 40cm. Calculate its diameter to 3 sig figs.

26cm

21cm   19cm

17cm

19C

1) Find the area of the trapezium shown.

2) Calculate $\frac{7}{10} \ x \ 5\frac{1}{3} \ x \ 1\frac{1}{4}$

3) Walking at 4 km/h a group took 6 hrs 45 minutes to complete their day trek. At what speed would they have had to walk to complete it in 6 hours?

d = 10cm
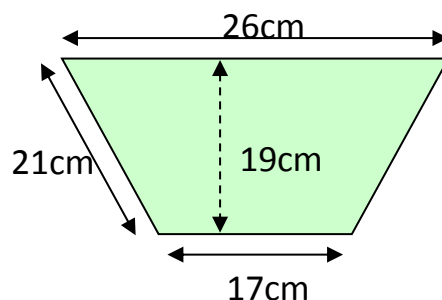
19D

1) Factorise $18rs^2 - 30rs$

2) The diagram shows four cylinders cut from a cuboid. Calculate the volume of the shape.

13cm

50cm

9cm

3) A building plot is 60cm long by 50cm wide. New plans increase the length by 20% and decrease the width by 20%. Calculate the percentage change in the area.
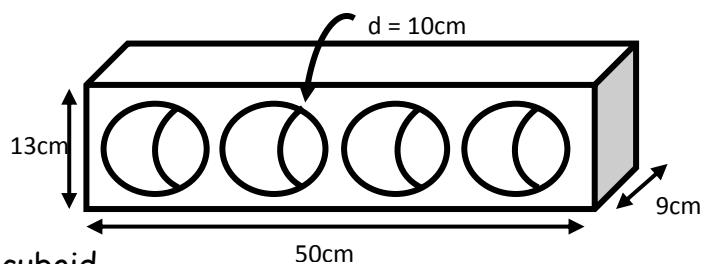
19E

1) How many small boxes of dimensions 5 cm by 4 cm by 9 cm can fit in a larger box of dimensions 12cm by 30cm by 18cm.

2) Change 46% to a fraction in its simplest form

3) Copy and fill in the sizes of **all** missing angles.

95°

61°
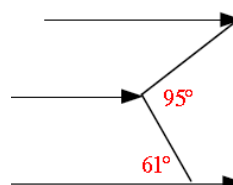
Set 20

20A

1) Solve the inequation $3(1 – t) \leq 2(3t + 6)$

2) Share £5 in the ratio 7 : 13

3) Find 7% of 180

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20B

1) Calculate $3\frac{1}{2} + 1\frac{4}{7} - 2\frac{1}{4}$

2) Change $62^{1}/_{2}\%$ to a fraction in its simplest form

3) Calculate the **shaded area** of the following shape:

9.7 cm

4 cm

6.5 cm

8 cm
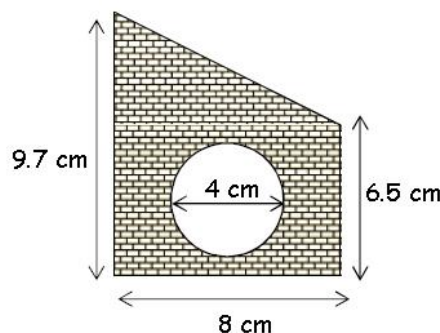
20C

1) Factorise $8x^2 – 12xa$

2) Convert 9000mm^3 to cm^3

3) A farmer uses 60 metres of fencing to form a rectangular pen in a field.
Given that the pen has breadth x metres, find an expression for its area.

X
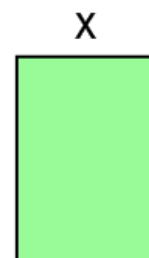
20D

1) How many small boxes of dimensions 3 cm by 5 cm by 6 cm can fit in a larger box of dimensions 30 cm by 24 cm by 8 cm.

2) Simplify $5(2a + 3b – 4c + 2) + 3(3a – 2b + c + 3)$

3) Calculate the volume of the shape shown in the diagram.

4cm

5cm
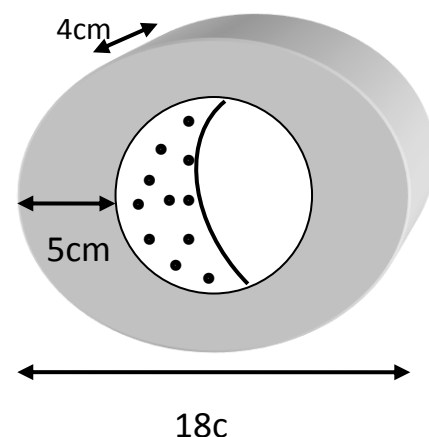
20E

1) Calculate $\left(\frac{3}{5} \times \frac{2}{3} - \frac{3}{10}\right) \div \frac{1}{4}$

2) Simplify $14 – 3(x – 4y) – (y – 5 + 8x)$

18c

3) A banquet costs £$(75 + 15n)$, where n is the number of people attending.
Calculate the **total** cost of the banquet if 84 people attend.

Set 21

21A

1) Factorise $2a^4 - 4a^3 + 6a^2$

2) Covert $^7/_{50}$ to a percentage
3) Convert $8m^3$ to cm^3

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Mathematics Department

21B

1) Simplify $9 - 4(2x - 3) - 2(x + 5)$

2) A bicycle wheel has a diameter of 53 cm.
   How many times must the wheel rotate if it is to cover 700 m ?
3) Calculate the length of the diagonal of the rhombus. **Area = 36cm²**

6cm
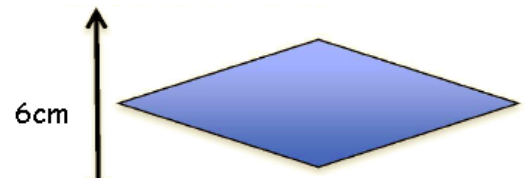
21C

1) Evaluate $3m^2 + 2n$ when m = -4 and n = -1

2) An 80 g packet of crisps contains 520 Kilojoules of energy.
   If a bag of crisps has 325 Kilojoules of energy, what weight would you expect it to be?
3) A shop reduced its prices by 13%.
   What is the sale price of a coat originally priced at £85?

20cm
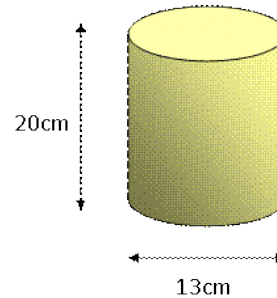
21D

1) Calculate $\dfrac{\frac{3}{8}}{\frac{1}{2} + 1\frac{1}{4}}$

2) Calculate the surface area of the cylinder
3) In a game a player scores 4 points for each correct answer and pays penalty points for

   each wrong answer. One player got 30 correct answers out of 90 questions and ended up

   with a total of -60 points.

   Make and solve an equation to find out how many points are given for a wrong answer.

13cm

21E

1) How many spheres of radius 4cm can fit into a box with dimensions 32 cm by 24cm by 40cm
2) Write down a formula for the nth term of this sequence: 2, 7, 12, 17, 22 …

3) A farmer uses 60 metres of fencing to form two congruent rectangular pens side by side in
   a field as shown. Given that the pen has breadth x metres, show that the total area of the
   pens is given by $A = 30x - \dfrac{3x^2}{2}$.

X
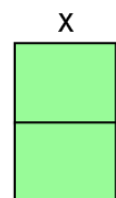
Set 22

22A

1) Copy and fill in the sizes of **all** missing angles.
2) If $x = -1$, $y = -4$ and $z = 2$, evaluate $x + y + z$

3) The square has side a cm long, and each triangle has altitude a cm.
   Prove that the area of this composite shape is given by $A = 3a^2$.

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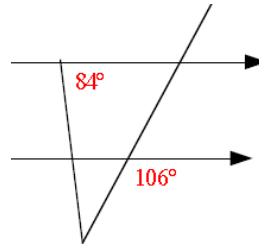
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22B

1) Calculate $\frac{2}{7}$ x $2\frac{4}{5}$ x $\frac{1}{4}$

2) Simplify $7(2x + 3y - z + 5) - 5(3x - 2y + z - 4)$

3) Which subject did Lauren do best in: Maths $^{18}/_{24}$, English $^{51}/_{75}$, History $^{42}/_{60}$, Art $^{28}/_{35}$
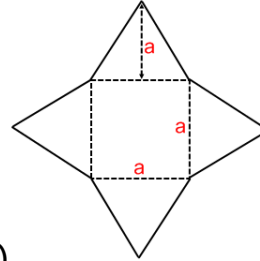
22C

1) A triangle has a base twice its height. The area of the triangle is $36m^2$.

   Form an equation and solve to find the base length and height of the triangle.

2) A box has dimension 12cm x 30cm x 48cm. It holds cylindrical cans of radius 3 and height 12cm. Calculate the % of 'wasted' space inside the box when as many cans as possible are packed inside.

3) This running track with semi-circular ends has perimeter P m.
   Prove that $P = 2x(2 + \pi)$.
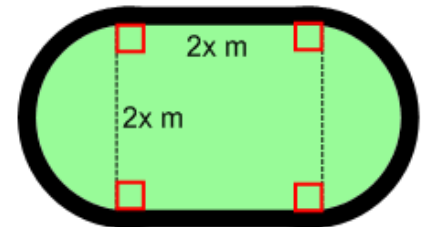
22D

1) Simplify $-k \times (-km^2)$

2) Three steel nails are shown. The lengths of the nails are in the ratio 1 : 3 : 5.
   The length of the middle nail is 7·5 centimetres. Calculate the length of the large nail.

3) The final speed of a car is v and can be calculated using the formula $v = u + at$ where u is the initial speed, a is the acceleration and t is the time taken.
   Find v if the acceleration is 2 m/s, the time taken is 10s and the initial speed is 4 m/s.

22E

1) Factorise $3b^4 + 6b^3 - 3b^2$

2) Find $66^2/_3\%$ of 180miles

3) The surface area of a cube is $82cm^2$. Calculate the length of one edge of the cube, correct to 2 sig figs.

Set 23

23A

1) Calculate $\left(3\frac{1}{2} \div \frac{3}{4}\right) \times \frac{1}{3}$

2) Covert 1.3 to a percentage

3) This running track with semi-circular ends has perimeter P m.
   Prove that P = x²(4 + π)

2x m

2x m

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1791

Mathematics Department
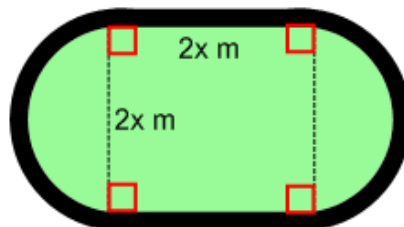
23B

1) If x = -1, y =-4, evaluate 2x – 3y

2) The supply of cornflakes at the scout camp was enough to last 20 scouts for 6 days.
   If 4 more scouts go to camp how many days will the cornflakes last?

3) Write down the order of rotational symmetry for these shape:
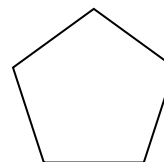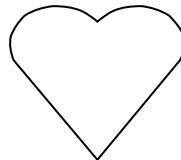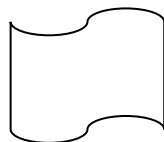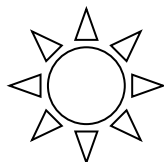
23C

1) Simplify -4p × (pqg)²

2) Write down a formula for the nth term of this sequence -4, -1, 2, 5, 8 …

3) Calculate the area of this shape.

7.5cm

2.6cm

9.3cm
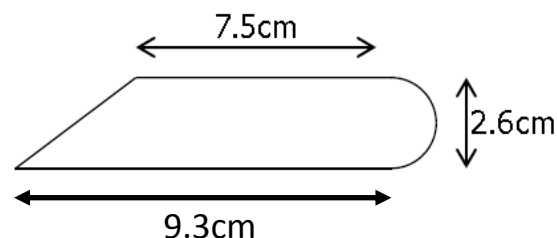
23D

1) Simplify 11 – 9(3r – 4s – 2)

2) A cylinder has a volume of 2 litres and diameter of 40cm. Calculate its height.

3) Calculate the volume of the shape shown opposite.

4cm

6cm

11cm
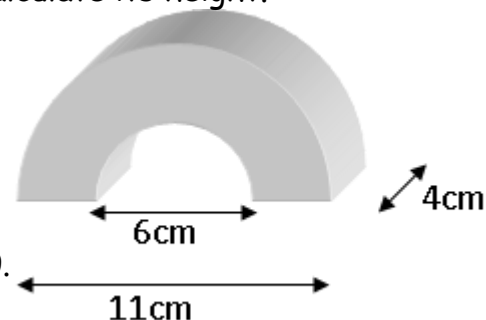
23E

1) Gladys bought a picture for £150 and later sold it for £220.
   Calculate her percentage profit correct to 3sf.

2) Write the compass direction NORTH EAST EAST as a bearing.

3) A dealer bought 120 carpets which had been damaged by fire and paid an average of

   £12.50 each for them. Fifteen were too badly damaged to sell but he sold the rest at a

   price which gave him 40% profit on this total outlay. What was his average selling price per

   carpet?

Set 24

24A

1) Calculate $\frac{2}{3}$ of $3\frac{1}{2} - 1\frac{3}{5}$

2) Make a formula for the surface area of this cube.

3) Solve the equation $3 - 4(2x - 1) = 6(1 - x)$

x cm
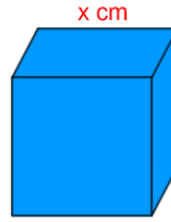
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24B

1) Simplify $(7p)^2 \times (-p)^2$

2) Covert $^5/_{16}$ to a percentage

3) Calculate the volume of the largest cylinder which can be cut from the cuboid shown in the diagram.

8cm

2cm

10cm
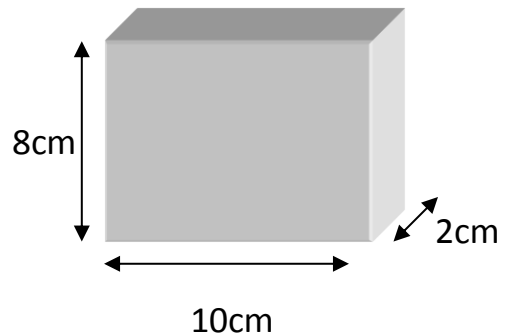
24C

1) Arthur ran around a circular field 3 times. If he ran a total distance of 750 m, what is the diameter and radius of the field?

2) An 80 g packet of crisps contains 520 Kilojoules of energy.
How much energy would you expect in a 200g Family bag of crisps?

3) Copy and complete to give the shape rotational symmetry of order 2:
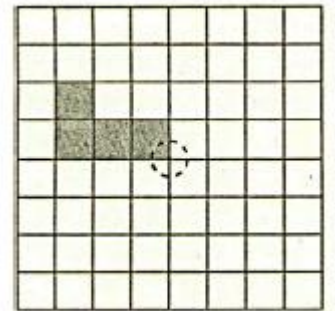
24D

1) If $x = -1$, $y = -4$ and $z = 2$, evaluate $(y - x)^z$

2) Find the mean, median, mode and range:

$10,\ 5\frac{1}{2},\ 2\frac{1}{2},\ 4\frac{1}{2},\ 5\frac{1}{2},\ 2\frac{1}{2},\ 5\frac{1}{2},\ 4$

3) Circular discs of radius 3.5cm are cut from a rectangular sheet of cardboard measuring 50cm by 30cm. This diagram is not drawn to scale! Calculate the % waste.

24E

1) Calculate $\left(\frac{3}{5} + \frac{1}{5} + \frac{2}{10}\right) \times \frac{3}{4}$

2) Find $33^1/_3\%$ of 117kg

3) Three consecutive numbers are to be added together.
(a) If x is the smallest number, what are the other two?
(b) Write down a formula for the total, T, of the three numbers, using your answer to (a).

Set 25

25A

1) Simplify $20rs^2 \div 4s^2$

2) Find 15% of £85

3) Is the graph of the equation $x = {}^-9$ a horizontal or vertical line?

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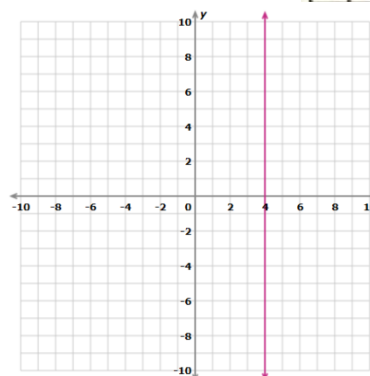
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25B

1) Simplify $8g - (2 - g)g$

2) Write down a formula for the nth term of this sequence: $1, {}^1/_2, {}^1/_3, {}^1/_4, {}^1/_5, \ldots$

3) Copy and complete to give the shape rotational symmetry of order 4:
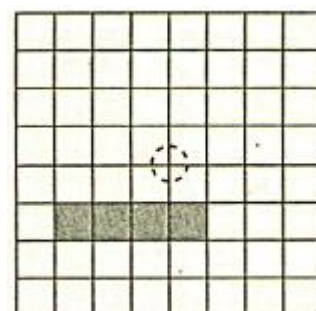
25C

1) If $x = -1$, $y = -4$ and $z = 2$, evaluate $xy + 2yz$

2) Change $87^1/_2\%$ to a fraction in its simplest form

3) What is the equation of this line:

25D

1) Calculate $\left(\dfrac{3}{4} \div \left(\dfrac{1}{2} \times \dfrac{1}{2} \right) \div \dfrac{1}{3} \right)$

2) How many spheres of radius 7cm can fit into a box with dimensions 21cm by 30cm by 35cm

3) Find total surface area of the shape shown.

d = 6cm

12cm

7cm

17cm
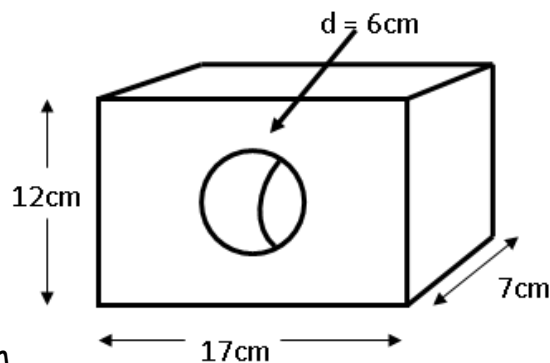
25E

1) Factorise $8xy + 12xz$

2) A boy takes 150 steps to cover a distance of 120 m. How far would he walk after 250 steps?

3) Find the linear equation connecting the x and y co-ordinates for the following points:
(–3, –9), (–2, –6), (–1, –3), (0, 0), (1, 3), (2, 6), (3, 9)

Set 26

26A

1) Is the graph of the equation $y = {}^{-}2$ a horizontal or vertical line?

2) Simplify $28k^2m^2 \div 7k^2m$

3) What is the equation of this line:

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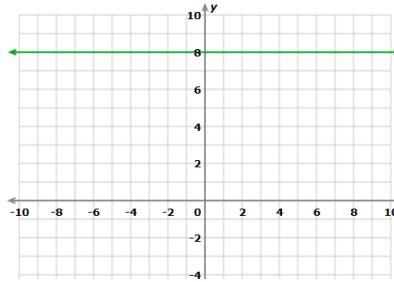
26B

1) Two years ago Miss Smith bought a flat for £65500. In the first year it appreciated in value by 7%. In the second year the value depreciated by 5%.
   Find the current value of the flat. Give your answer correct to 3 significant figures.

2) A cylinder has volume of 0.95 litres and a height of 470mm.
   Calculate its diameter to 3 sig figs

3) How many cylinders of height 10cm and diameter 4cm fit into a box with dimensions of

   20cm by 48cm by 12cm?

26C

1) Find the total surface area of the shape shown.

2) Change $37^1/_2\%$ to a fraction in its simplest form

3) Calculate $\left(1\dfrac{2}{3} + \dfrac{1}{2}\right) \div 2\dfrac{1}{6}$

3cm

2cm

10cm
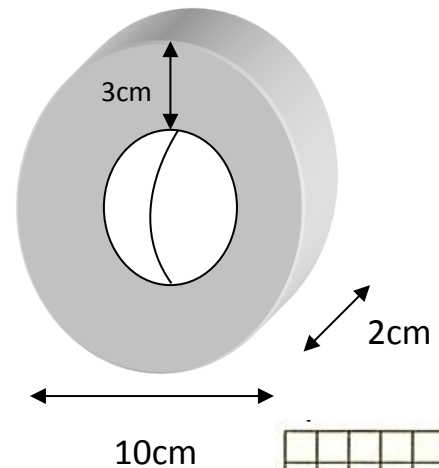
26D

1) Change 140% to a fraction in its simplest form

2) Copy and complete to give the shape rotational symmetry of order 2:

3) Make a formula for the surface of this cuboid.

c cm

b cm

a cm
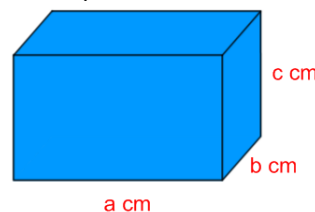
26E

1) Find the linear equation connecting the x and y co-ordinates for the following points:
   (–5, –7), (–4, –6), (–3, –5), (–2, –4), (–1, –3), (0, –2), (1, –1), (2, 0), (3, 1),

2) Factorise $3b^4 + 6b^3 - 3b^2$

3) This shape is constructed from a semi-circle and square.
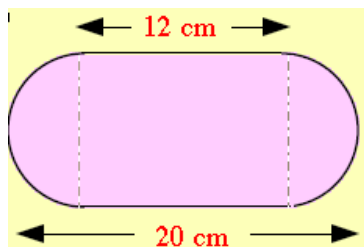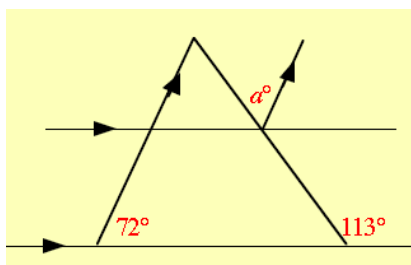   Write down a formula for the i) perimeter and ii) area of this shape:
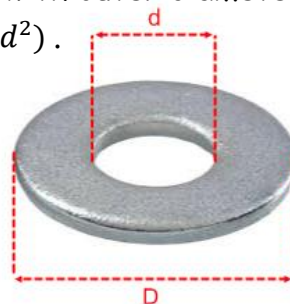
2x cm

2x cm
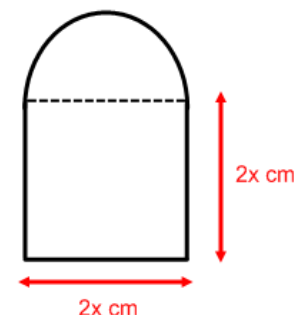
Set 27

27A

1) Calculate the value of a°

2) Factorise $5t^3 + 10t^2 + 15t$

3) Calculate the perimeter of this shape:

27B

1) Calculate $5\frac{1}{3} \div 1\frac{1}{3} - 2\frac{1}{5}$

2) Simplify the ratio $4\frac{1}{2} : 6\frac{3}{4}$

3) Prove that the area of the annulus (e.g. a washer) shown below with outer diameter D mm and inner diameter d mm is given by the formula: $A = \frac{1}{4}\pi(D^2 - d^2)$.

27C

1) Change 35% to a fraction in its simplest form

2) The well is 18m deep, it takes 40 complete turns of the handle to raise the bucket from the bottom to the top. Calculate the diameter of the roller.

3) Tickets for a school concert are sold at £3 for adults and £2 for children.
(a) If *p* adults and *q* children buy tickets, write a formula for the total value, *T*, of the ticket sales.
(b) Find the total value of the ticket sales if *p* = 50 and *q* = 20.

27D

1) Simplify r(s + 1) – s(r + 2) + 2(r + s)

2) Copy and complete to give the shape rotational symmetry of order 4:

3) Calculate $5\frac{2}{3} + 1\frac{3}{7} \times 2\frac{1}{3}$
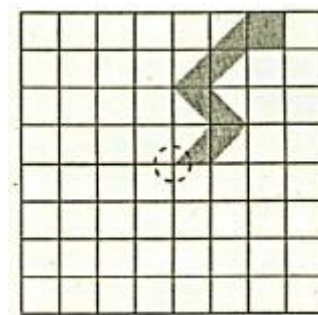
27E

1) How many cylinders of height 9cm and diameter 5cm

   fit into a box with dimensions of 27cm by 30cm by 16cm ?

2) Find 37.5% of 26kg

3) Find the linear equation connecting

   the x and y co-ordinates for this plot:
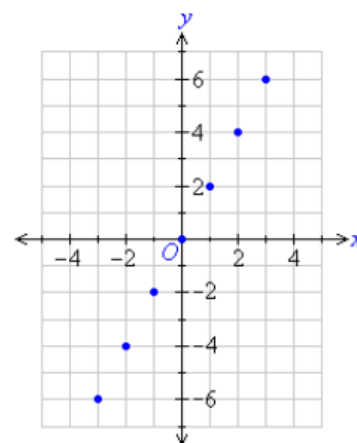
Set 28

28A

1) Calculate $2\frac{1}{3} + \frac{5}{6}$ of $1\frac{2}{5}$

2) Change $12^1/_2\%$ to a fraction in its simplest form

3) The formula to convert temperatures from degrees Fahrenheit (°F)
   into degrees Celsius (°C) is $C = {}^5/_9(F - 32)$
   Calculate the temperature in °C which is equivalent to a temperature of -7 °F .
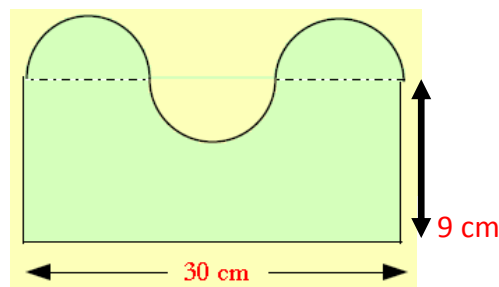
Fortrose Academy

1791

Mathematics Department

28B

1) Simplify $7b - (b - 2)b$

2) The distance travelled, *s* metres, by a car is given by $s = ut + {}^1/_2ft^2$.
   Here *u* is the car's initial speed (in m/s), *t* the time (in seconds) and *f* the acceleration (in m/s^2).
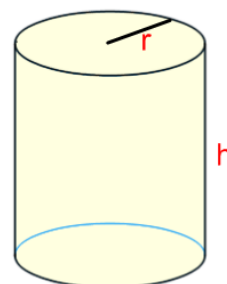   Find *s* when $u = 50$, $t = 4$, $f = -5$

3) Calculate the perimeter of this shape

9 cm

30 cm

28C

1) Calculate $2\frac{1}{2} \times 1\frac{3}{4} - 2\frac{1}{3}$

2) Covert $^3/_{11}$ to a percentage

3) Prove that the total surface of this cylinder is given by the formula $A = 2\pi r(r + h)$

r

h

28D

1) Factorise $4q^4 + 3q^3 + 2q^2$

2) Change $10^1/_4\%$ to a fraction in its simplest form

3) A rectangular box measuring 12cm x 4cm x 4 cm contains golf ball of diameter 4cm.

   i) How many balls are in a box. ii) If the volume of a ball can be found using the formula

   $\frac{4}{3}\pi r^3$, where r = radius of ball, find the volume of empty space in the box.

28E

1) Mrs Brotherwood sold her house and bought a new Range Rover Sport for £65000. It depreciated by 43% in year 1, then 27% in year 2 and 18% in year 3. How much is the car now worth?

2) A tolerance is given as (± 0.6) mm. The maximum value allowed is 32.4mm. What must the minimum value be?

3) Simplify the ratio 1.5g : 250 mg