OCR
Oxford Cambridge and RSA

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GCSE (9–1) Mathematics
J560/02 Paper 2 (Foundation Tier)
Sample Question Paper

Date – Morning/Afternoon
Time allowed: 1 hour 30 minutes

Model Solutions

You may use:
- Geometrical instruments
- Tracing paper

Do not use:
- A calculator

First name									
Last name									
Centre number						**Candidate number**				

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **100**.
- The marks for each question are shown in brackets **[ ]**.
- This document consists of **20** pages.

Answer **all** the questions

1 **(a)** Work out.

$4 \times 2 - 1$

$(4 \times 2) - 1$

$8 - 1 = 7$

(a) ....7.... **[1]**

(b) Find $\frac{1}{4}$ of 16.

$\frac{1}{4} \times 16 \rightarrow \frac{1}{4} \times \frac{16}{1} \rightarrow \frac{16}{4} = 4$

(b) ....4.... **[1]**

2 A tin contains four different types of sweet.
A sweet is taken from the tin at random.
The table below shows some of the probabilities of taking each type of sweet.

Sweet	Toffee	Fudge	Jelly	Mint
Probability	0.4	0.2	0.1	0.3

(a) Complete the table. $1-(0.4+0.2+0.3)$ $1-(0.9) = 0.1$ **[2]**

(b) What is the probability that a toffee or a mint is taken from the tin?

$P(T \text{ or } M) = 0.4 + 0.3 = 0.7$

(b) ....0.7.... **[2]**

3 Peter says

The sum of an odd number and an even number is even.

The example $3 + 4 = 7$ shows that Peter is **not** correct.

Write an example to show that each of these statements is **not** correct.

(a) The sum of two prime numbers is always odd.

$3 + 5 = 8$ (3: prime, 8: even) ..... **[1]**

(b) Squaring a whole number always results in an even number.

$5^2 = 25$ (5: whole number, 25: odd) ..... **[1]**

4 Charlie, Mo and Andrzej share a flat.

- Charlie pays 25% of the rent.
- Mo pays $\frac{1}{2}$ of the rent.
- Andrzej pays £450.

How much do they pay altogether for the rent?

C = 25% = 1/4

M = 1/2

So A = 1 − (1/2 + 1/4)
= 1 − (2/4 + 1/4)
= 1 − (3/4)
= 1/4 = €450

£ ..... **[4]**

So A pays a quatr which is €450

So the whole rent is 4 × €450 = €100 × 2 = €1800

5 The table below shows the number of tonnes of rice produced in a year in five countries.

Country	Rice produced (tonnes)
China	1.43×10^8
India	9.9×10^7
Vietnam	2.71×10^7
Thailand	2.05×10^7
Brazil	7.82×10^6

(a) Which country produced the most rice?

China because its number of tonnes is to the highest power of 10 → 10^8

(a) China **[1]**

(b) Write 2.71×10^7 as an ordinary number.

7 times

2.71 00000 → 27,100,000

(b) 27 100 000 **[1]**

(c) One tonne is equal to 1000 kilograms.

Change 7.82×10^6 tonnes to kilograms.
Give your answer in standard form.

So $(7.82 \times 10^6) \times 1000$

$= 7.82 \times 10^6 \times 10^3$

$= 7.82 \times 10^{6+3}$

$= 7.82 \times 10^9$ kg

(c) 7.82×10^9 kg **[2]**

(d) How many **more** tonnes of rice did India produce than Thailand?
Give your answer in standard form.

$9.9 \times 10^7 - 2.05 \times 10^7$

$(9.9 - 2.05) \times 10^7$

7.85×10^7

(d) 7.85×10^7 tonnes **[2]**

6 **(a)** A square has an area of 100 cm^2.

Find its perimeter.

Square area $= x \times x = x^2$

$x^2 = 100$

$x = \sqrt{100} = 10$ cm per side

Perimeter $= x + x + x + x = 4x$

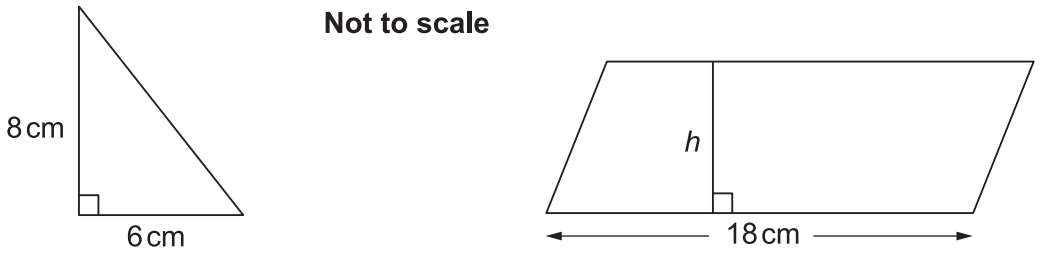
$= 4x$

$= 4(10) = 40$ cm

(a) ..... 40 ..... cm **[2]**

(b) The area of the parallelogram is **three** times the area of the triangle.

Not to scale



Show that the perpendicular height h of the parallelogram is 4 cm. **[4]**

$P = 3 \times T$

Area of T $\rightarrow$ $1/2 \times 6 \times 8 = 48 \times 1/2 = 24$ cm^2

$P = 3 \times T$

$P = 3 \times 24 = 24 + 24 + 24 = 72$ cm^2

Area of P $= 72$ cm^2 = base $\times$ perpendicular height

$= 18 \times h$

$72 = 18 \times h$

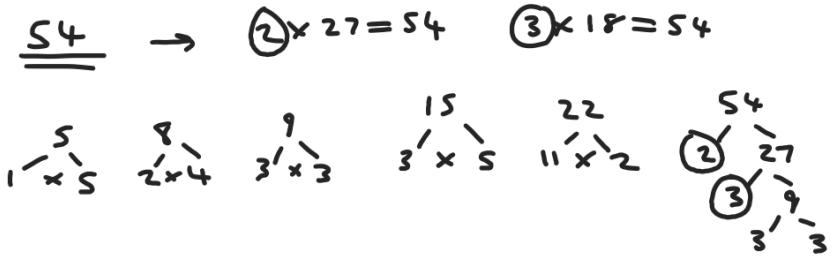
$4 = h$

7 Here are six numbers.

5	8	9	15	22	54

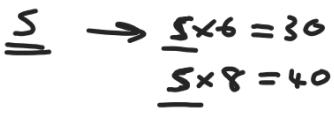
From these numbers, find a number that is

(a) a multiple of two and a multiple of three,



(a) ..... [1]

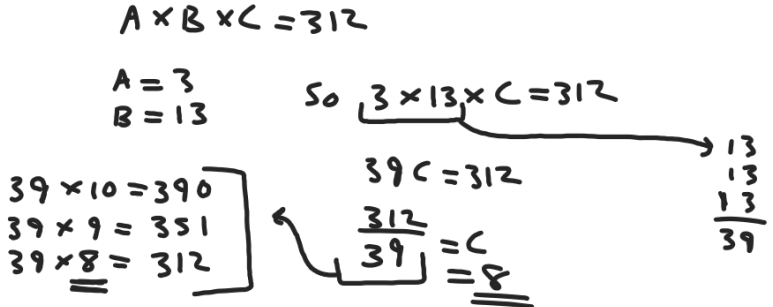
(b) a factor of 30 and a factor of 40.



(b) ..... [2]

8 **(a)** The product of three numbers is 312.
Two of the numbers are 3 and 13.

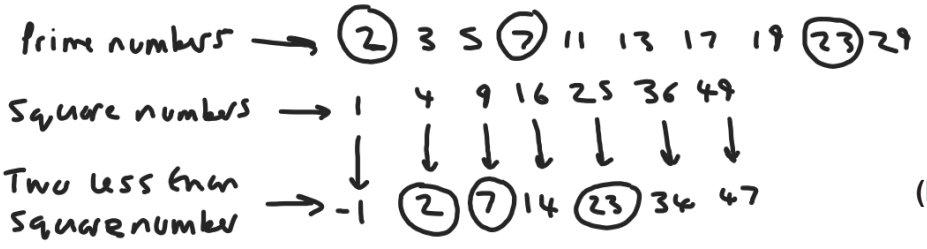
What is the third number?



(a) ..... [3]

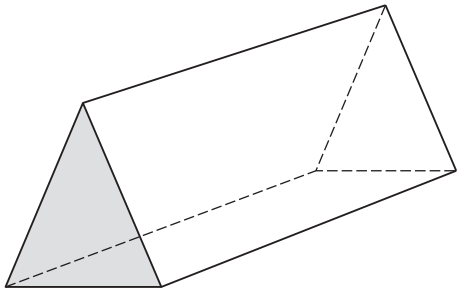
(b) Find **three different** numbers that are each

- a prime number
- two less than a square number.

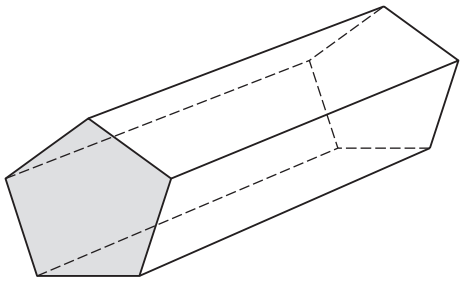


(b) .... [3]

9 These prisms have different shapes as end faces.



Triangle



Pentagon

(a) Complete this table.

Shape of end face	Number of faces	Number of edges	Number of vertices
Triangle (3 sides)	5	9	6
Rectangle (4 sides)	6	12	8
Pentagon (5 sides)	7	15	10
Hexagon (6 sides)	8	18	12

[2]

(b) How many edges and vertices does a prism with a 100-sided end face have?

Edges → 3 × number of sides
3 × 100 = 300

Vertices → 2 × number of sides
2 × 100 = 200

(b) edges 300

vertices 200

[2]

(c) *F* is the number of faces in a prism.
N is the number of sides of its end face.

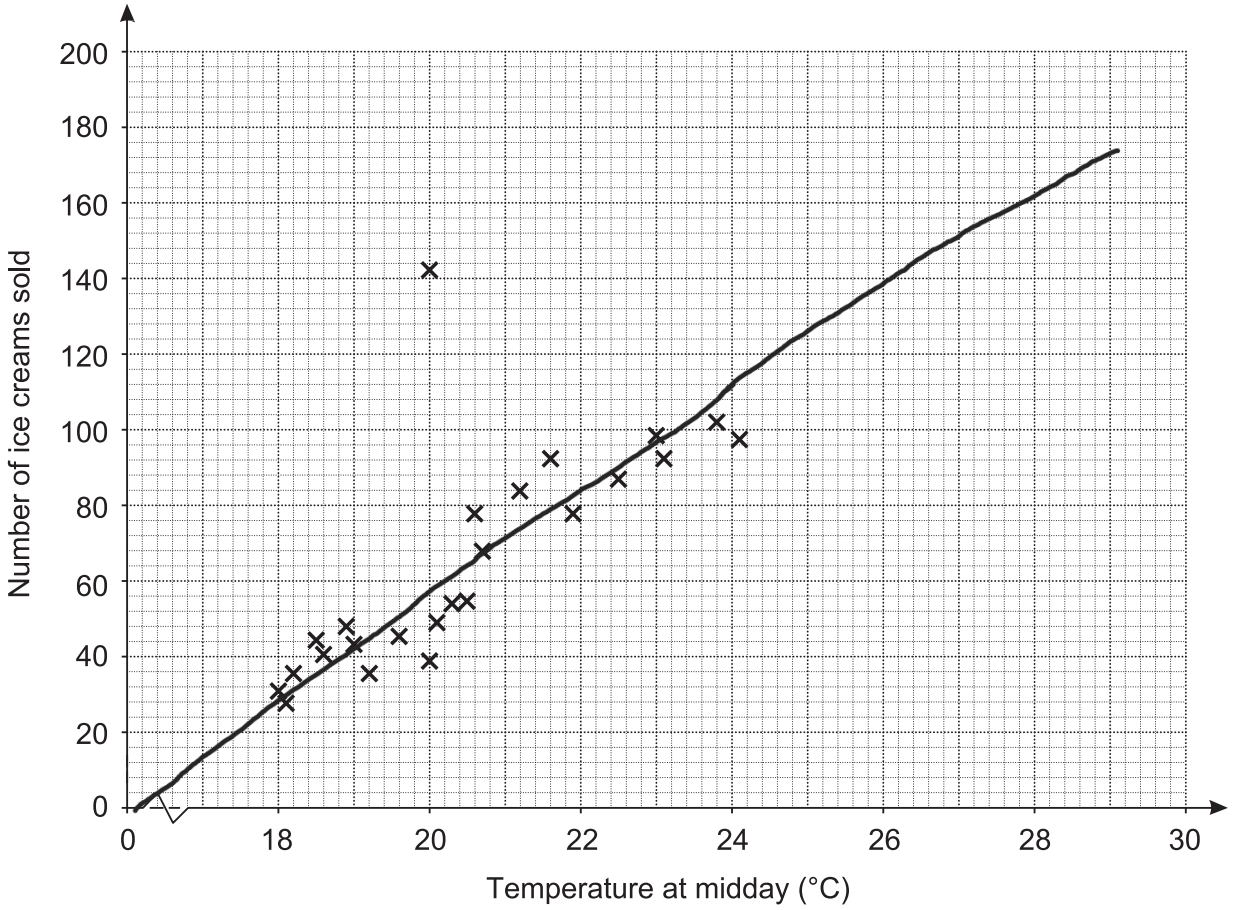
Write down a formula connecting *F* and *N*.

Prisms have 2 more faces than number of sides of there end faces.

So → $F = N + 2$

(c) $F = N + 2$ **[2]**

10 The graph shows the number of ice creams sold in a shop each day against the temperature at midday that day.



(a) **(i)** Describe the relationship between the temperature at midday and the number of ice creams sold.

Positive correlation ..... **[1]**

(ii) One data point is an outlier.

Give a reason why this does not fit the rest of the data.

He sold far more ice creams than you would expect him to for a 20 °C day. ..... **[1]**

(b) Use the scatter graph to predict the number of ice creams sold on a day when the temperature at midday was

(i) 22°C

(b)(i) 84 **[1]**

(ii) 28°C.

(ii) 162 **[1]**

(iii) Explain which of these two predictions is more reliable.

b(i) for 22°C because it is within the range of the given data

[2]

(c) A newspaper headline reads

High temperatures make more people buy ice cream!

Does the graph above prove this claim?
Give a reason for your decision.

No, because may be other factors involved

[2]

11 **(a)** A shop sold goods worth a total of £50 000 in January.
The value of goods sold in February was 10% lower than in January.

Calculate the value of goods sold in February.

£50,000 × 0.9
= 5 × 10,000 × 0.9
= 10,000 × 4.5
= £45 000

(a) £ 45,000 **[2]**

(b) Each month, the value of goods sold continued to be 10% lower than the previous month.
When the value of goods sold was less than £35 000, the shop closed at the end of that month.

Show that the store closed at the end of May.
You must show your working. **[3]**

March → £45000 − 10.1%
= £45,000 − £4,500 = £40,500

April → £40,500 − 10.1%
= £40,500 − £4,050 = £36,450

May → £36,450 − 10.1%
= £36,450 − £3645 = £33,450 − £645
= £33,000 − £195
= £32,805 < £35,000

(c) The store reopens under new management and sells goods worth £100 000 in the first month.

- The value of goods sold in the second month is 20% more than the first month.
- The value of goods sold in the third month is 10% less than the second month.

Find the percentage increase in the total value of goods sold from the first month to the third month.

Second month → £100,000 × 1.2
= £120,000

Third month → £120,000 − 10%
= £120,000 − £12,000
= £108,000

First to Third → £100,000 to £108,000
→ £108,000 / £100,000 = 1.08 = 8% increase

(c) ..... 8 ..... % **[5]**

12 **(a)** Solve.

$5x = 2x + 18$

$5x = 2x + 18$
$3x = 18$
$x = 6$

(a) $x =$ ..... 6 ..... **[2]**

(b) Solve by factorising.

$x^2 + 8x + 15 = 0$

$5 \times 3 = 15$
$5 + 3 = 8$

$(x + 5)(x + 3) = 0$

$x + 5 = 0$ $\quad x + 3 = 0$
$x = -5$ $\quad x = -3$

(b) $x =$ ..... −5 or −3 ..... **[3]**

13 Eva's camera takes photos with width and height in the ratio 3 : 2.
Photos can be printed in the following sizes.

20 cm by 16 cm 14 cm by 10 cm 24 cm by 16 cm 12 cm by 8 cm

Eva says

Only two of these sizes have the same ratio as my photos!

(a) Which sizes have the same ratio as her photos?

÷4 (20 : 16 → 5 : 4) ÷4 → NO ÷8 (24 : 16 → 3 : 2) ÷8 → YES

÷2 (14 : 10 → 7 : 5) ÷2 → NO ÷4 (12 : 8 → 3 : 2) ÷4 → YES

24 by 16 and 12 by 8 ..... **[2]**

(b) Eva has a display board measuring 45 cm by 60 cm.
She wants to display postcards, each measuring 9 cm by 6 cm.

If no postcards overlap, find the maximum number of postcards she can display on the board.

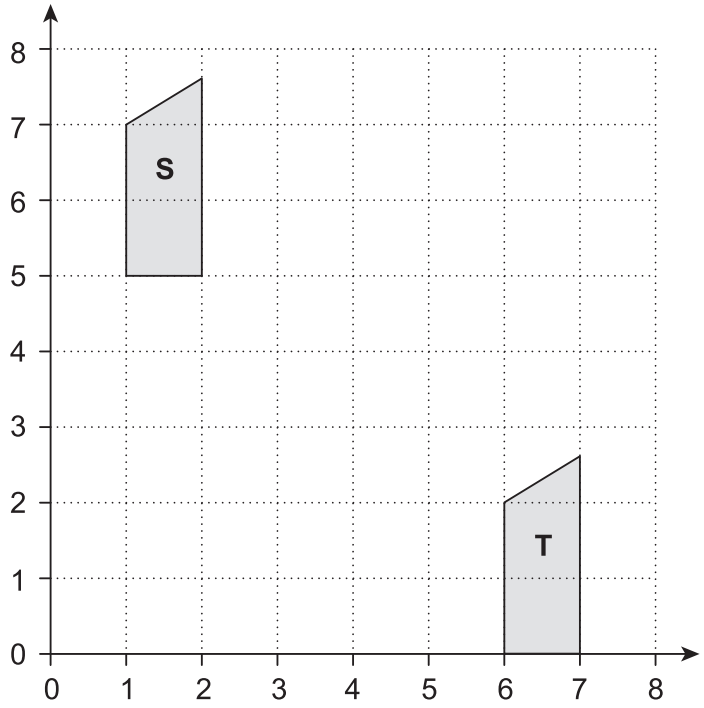
Number will fit lengthways → $\frac{60}{6} = 10$ postcards along length

Number will fit according to height = $\frac{45}{9} = 5$ postcards

Total number of postcards → $5 \times 10 = 50$

(b) 50 ..... **[3]**

14 **(a)** Here is a coordinate grid.



Shape S is translated to Shape T using vector $\begin{pmatrix} p \\ q \end{pmatrix}$.

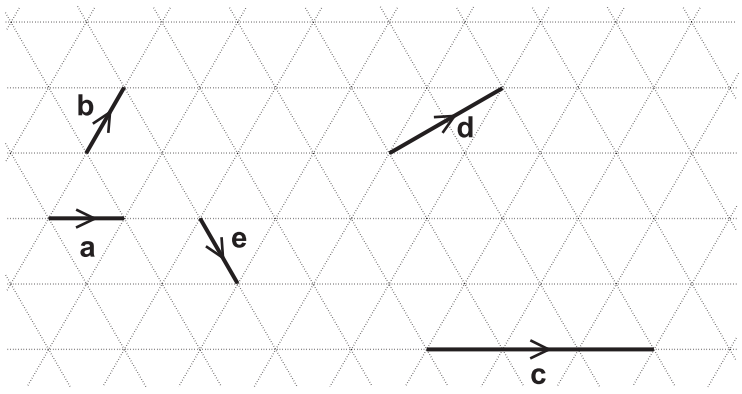
Write down the values of p and q.

Use one point on bottom corner (2,5) to work this out The point goes 5 right and 5 down. So $\begin{pmatrix} 5 \\ -5 \end{pmatrix}$

(a) p = 5

q = -5 **[2]**

(b) Vectors **a**, **b**, **c**, **d** and **e** are drawn on an isometric grid.



Write each of the vectors **c**, **d** and **e** in terms of **a** and/or **b**.

c = 3a

d = a + b

e = a − b

[3]

15 Sam and two friends put letters in envelopes on Monday.
The three of them take two hours to put 600 letters in envelopes.

(a) On Tuesday Sam has three friends helping.

Working at the same rate, how many letters should the **four** of them be able to put in envelopes in two hours?

$\left(\frac{600}{3}\right) \times 4 \rightarrow 200 \times 4 = 800$

(a) ....800.... **[2]**

(b) Working at the same rate, how much longer would it take **four** people to put 1000 letters in envelopes than it would take **five** people?

3 friends take 2 hours = 600
= take 1 hour = 300

So 1 takes 1 hour = 100

So 1000 will take 10 hours for 1 person

$\frac{10}{4}$ for 4 people = 2.5 hours

$\frac{10}{5}$ for 5 people = 2 hours

So 2.5 − 2 = 0.5 hours

(b) ....30 minutes.... **[4]**

(c) Sam says

> It took two hours for three people to put 600 letters in envelopes.
> If I assume they work all day, then in one day three people will put 7200 letters in envelopes because $600 \times 12 = 7200$.

Why is Sam's assumption not reasonable?
What effect has Sam's assumption had on her answer?

She has assumed 'all day' means they will be working for 24 hours, but it is not reasonable for them to work with no break. So her answer is an over-estimate. **[2]**

16 Abi, Ben and Carl each drop a number of identical drawing pins, and count how many land with the pin upwards. The table shows some of their results.

	Number of pins dropped	Number landing 'pin up'
Abi	10	4
Ben	30	9
Carl	100	35

(a) Abi says

> As a drawing pin can only land with its pin up or with its pin down, the probability of a drawing pin landing 'pin up' is $\frac{1}{2}$.

Criticise her statement.

Not correct because outcomes are not equally likely

[1]

(b) Carl's results give the best estimate of the probability of a drawing pin landing 'pin up'. Explain why.

He carried out largest number of trials.

[1]

(c) Two pins are dropped.

Estimate the probability that both pins land 'pin up'.

$P(\text{landing 'pin up'}) = \frac{35}{100} = 0.35$

$P(\text{both 'pin up'}) = 0.35 \times 0.35 = \frac{35}{100} \times \frac{35}{100} = \frac{(35 \times 30) + (35 \times 5)}{10000}$

$= \frac{(1050) + (175)}{10000}$

$= \frac{1125}{10000} = 0.1125$

(c) 0.1125 **[2]**

17 In this row of boxes, you start with 5 and 7.

5	7			

You add 5 and 7 to get 12 to go in the third box.
You add 7 and 12 to get 19 to go in the fourth box.
You add 12 and 19 to get 31 to go in the fifth box.

5	7	12	19	31

Complete these rows of boxes using the rule shown above.

(a)

4	6	10	16	26
		4+6=10	10+6=16	16+10=26

[1]

(b)

8	13	21	34	55
21-13=8	34-21=13	55-34=21		

[2]

(c) Complete this row of boxes, writing your expressions in their simplest form.

a	*b*	$a+b$	$a+2b$	$2a+3b$

[2]

(d) Use your answer to **(c)** to help you fill in the missing numbers in this row of boxes.

6	15	21	36	57

$b=15$ $\quad 15+6=21$ $\quad 21+15=36$

[3]

(1) $a=6$

(2) $2a+3b=57$

$2(6)+3b=57$

$3b=45$

$b=15$

18 Amin is attempting to solve the following equation.

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

His **incorrect** solution is shown below.

	$(x + 1)(x + 4) = (x - 2)(x - 3)$
Step 1	$x^2 + 4x + x + 4 = x^2 - 3x - 2x + 6$
Step 2	$x^2 + 5x + 4 = x^2 - x + 6$
Step 3	$5x + 4 = -x + 6$
Step 4	$6x + 4 = 6$
Step 5	$6x = 2$
Step 6	$x = \frac{1}{3}$

(a) Identify the step in which Amin made his first error and explain why this step is incorrect.

Step 2 right side . Should be $x^2 - 5x + 6$

[2]

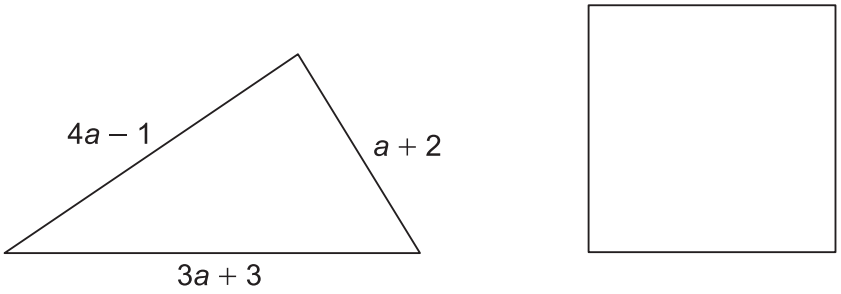
(b) Write out a correct solution to the equation. **[2]**

$x^2 + 5x + 4 = x^2 - 5x + 6$

$10x = 2$

$x = 2/10 = 1/5$

19 The perimeter of the triangle is the same length as the perimeter of the square.



Find an expression for the length of one side of the square in terms of a.
Give your answer in its simplest form.

Perimeter of triangle $= 4a - 1 + a + 2 + 3a + 3$

$= 4a + a + 3a + (2 + 3) - 1$

$= 8a + 4$

Perimeter of square $\rightarrow$ $4 \times$ Length

$4 \times \text{Length} = 8a + 4$

$\text{Length} = \frac{8a + 4}{4}$

$= 2a + 1$

..... **[4]**