

Tuesday 15 January 2013 – Afternoon

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

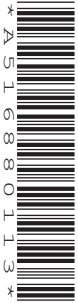
Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:

- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour



Candidate forename		Candidate surname	
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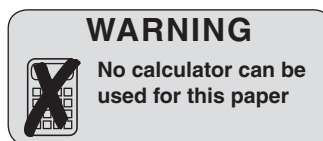
Centre number							Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate 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 necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

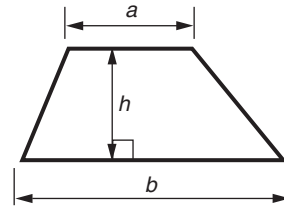
- The number of marks is given in brackets [] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.



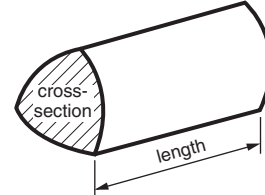
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = (area of cross-section) \times length

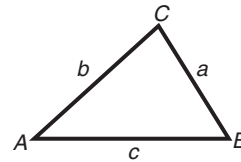


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

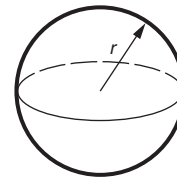
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



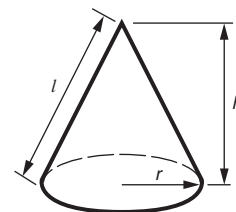
Volume of sphere = $\frac{4}{3}\pi r^3$

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



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



The Quadratic Equation

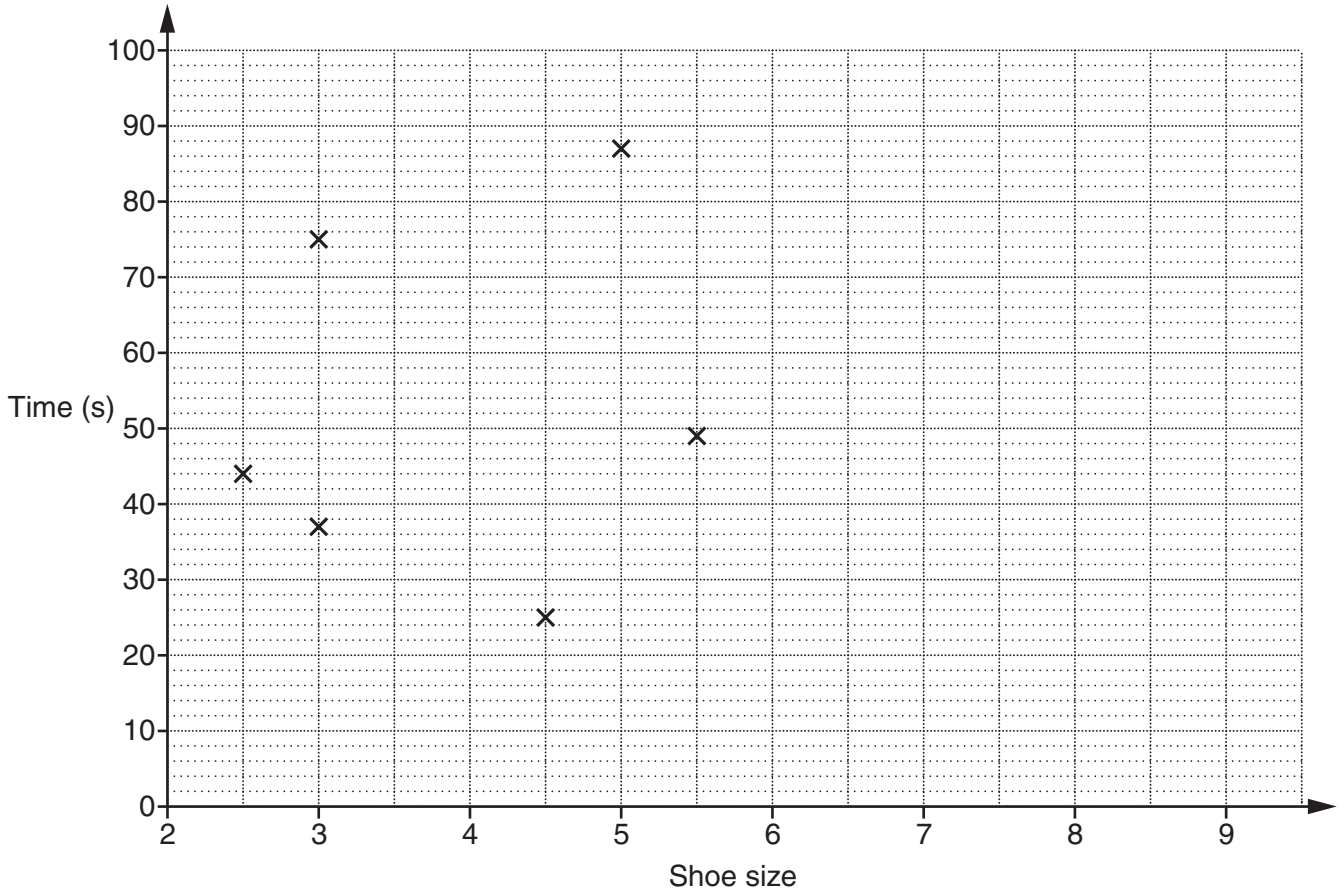
The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

PLEASE DO NOT WRITE ON THIS PAGE

- 1 Rajneev records data for ten students in her school. She records their shoe size and the time it takes them to complete a puzzle.

Shoe size	2½	3	3	4½	5	5½	6	6	7½	9
Time (s)	44	37	75	25	87	49	34	62	31	43



The first 6 points are plotted on the scatter diagram.

- (a) Complete the scatter diagram. [2]
- (b) Choose from the following to describe the diagram. Put a ring around your answer.

Negative
correlation

No
correlation

Positive
correlation

[1]

- 2 (a) Ann has 21 paperback books on her bookshelf.
Each paperback book is 2 cm wide.
Her bookshelf is 670 mm long.

Calculate how many **more** paperback books of this size she can fit on the shelf.

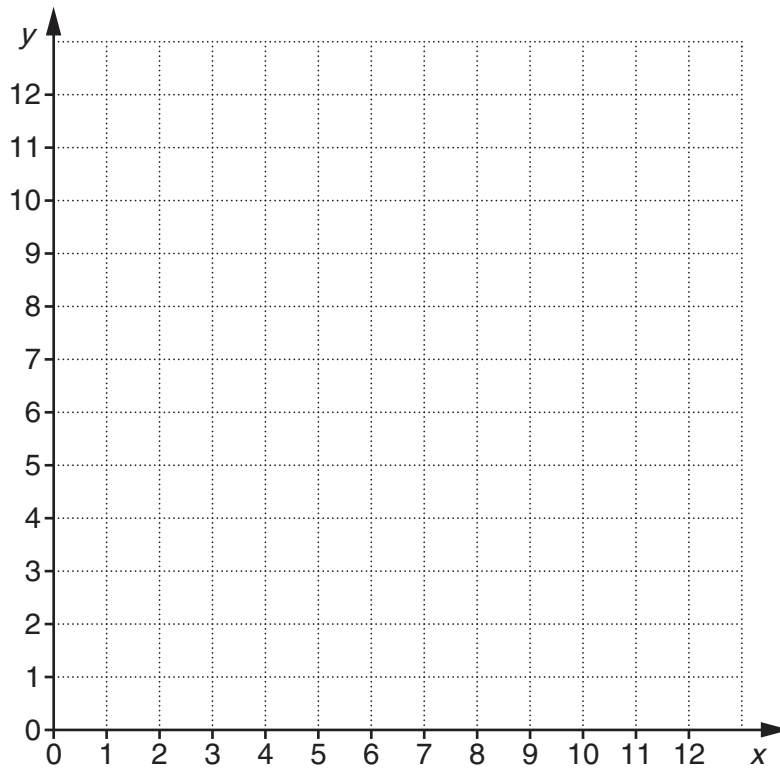
(a) _____ [4]

- (b) Ann buys 3 books.
They cost £3.99, £5.49 and £6.99.
She pays with a £20 note.

How much change should she get?

(b) £ _____ [3]

- 3 (a) Draw the straight line through (0, 8) and (12, 0).



[1]

- (b) Work out the gradient of your line.
Give your answer as a fraction in its simplest form.

(b) _____ [2]

- (c) Write down the equation of your line in the form $y = mx + c$.

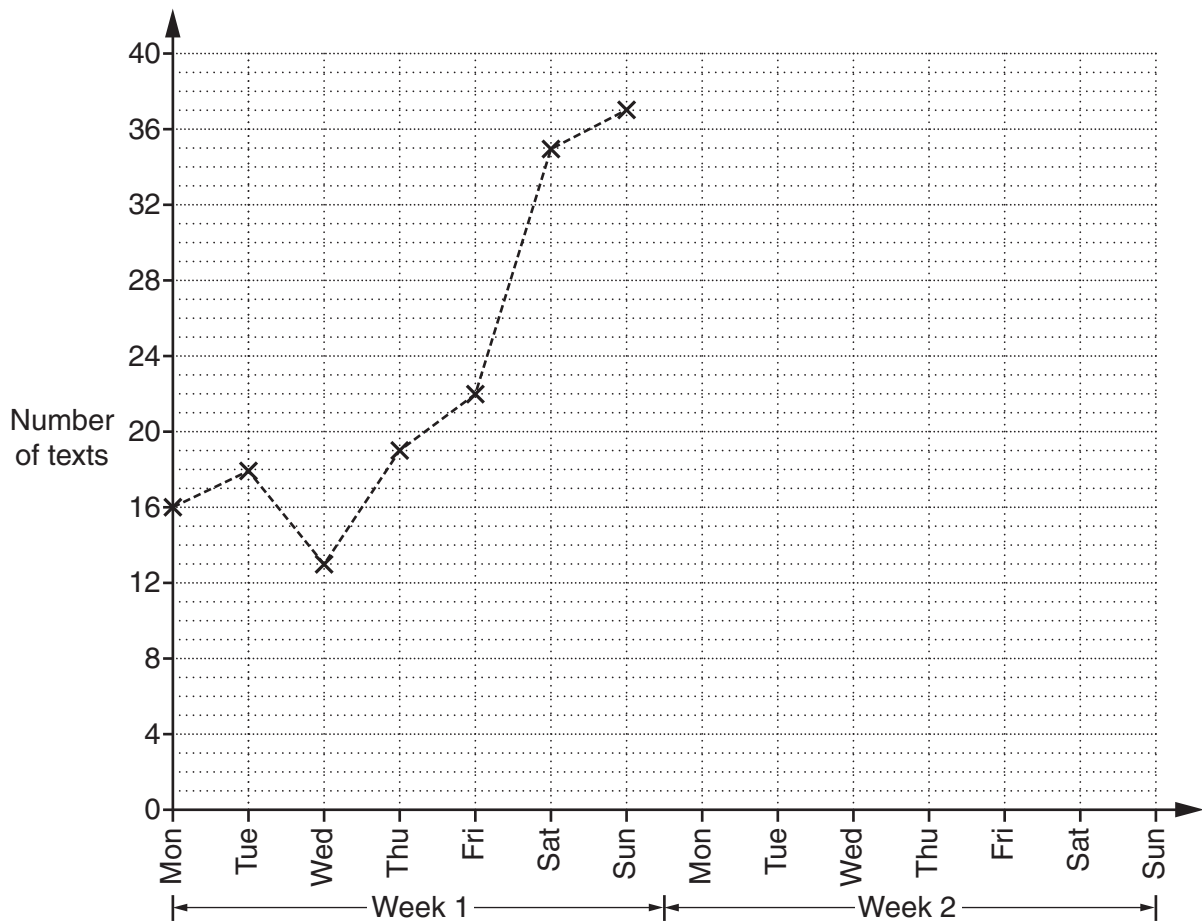
(c) _____ [2]

- (d) Work out the **gradient** of a line **perpendicular** to your line.

(d) _____ [1]

4 Jagoda keeps a record of how many text messages she receives each day over a 2-week period.

	Day	Number of texts		Day	Number of texts
Week 1	Monday	16	Week 2	Monday	19
	Tuesday	18		Tuesday	25
	Wednesday	13		Wednesday	21
	Thursday	19		Thursday	11
	Friday	22		Friday	23
	Saturday	35		Saturday	31
	Sunday	37		Sunday	



- (a) Complete the time series graph up to and including Saturday of Week 2. The data for Week 1 has already been plotted.

[2]

(b) Jagoda received 20% more texts in total in Week 2 than in Week 1.

How many texts did she receive on Sunday of Week 2?

(b) _____ [4]

5 Solve this inequality.

$$5n + 2 > 2n - 13$$

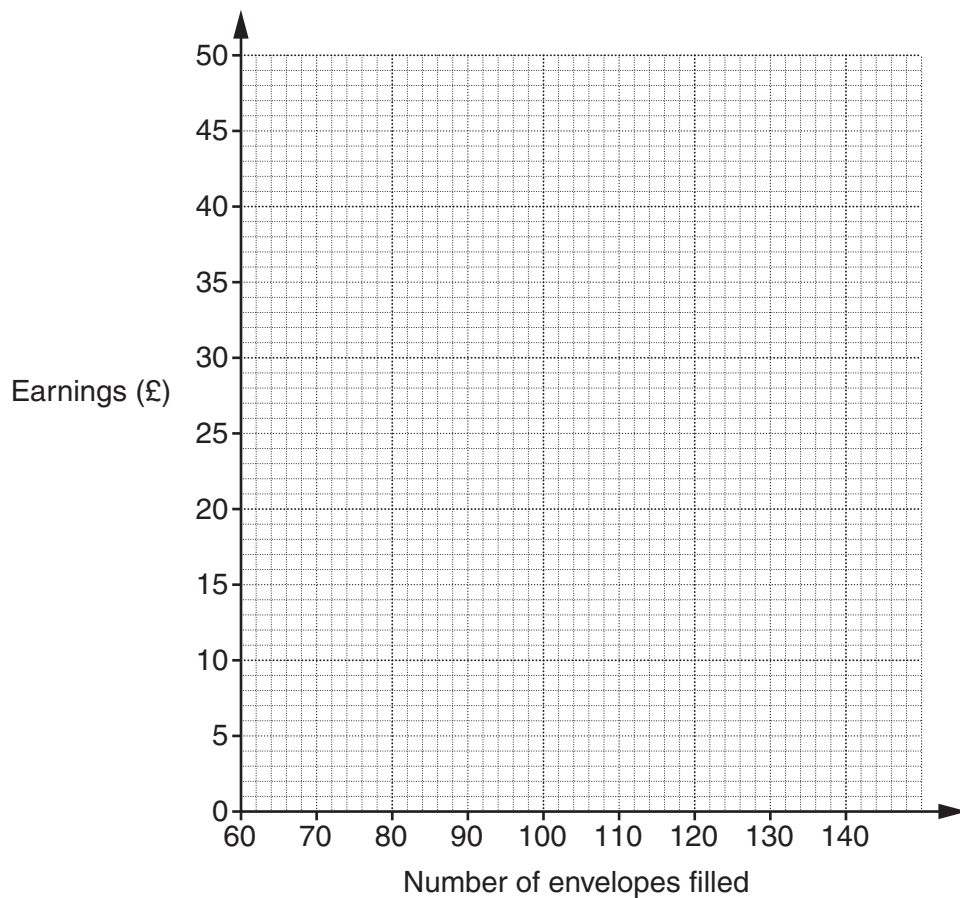
_____ [3]

- 6 (a) Lizzie has a part-time job putting leaflets into envelopes. She earns £30 a day for filling **up to** 90 envelopes. She earns 20p for every **extra** envelope she fills after 90.

(i) Complete this table showing how much she can earn.

Number of envelopes filled	60	70	80	90	100	110	120	130	140
Earnings (£)		30		30				38	

[2]



(ii) Plot the pairs of values on the grid and join them using straight lines.

[2]

(b) Alec also has a job filling envelopes.
He earns 30p for **every** envelope he fills.

(i) On the grid draw the straight line graph to show Alec's earnings for filling from 60 to 140 envelopes.
Label this line A. [2]

(ii) One day Alec and Lizzie find they have both earned the same amount of money and filled the same number of envelopes.

How many envelopes did they each fill?

(b)(ii) _____ [1]

7 Work out.

(a) $\frac{4}{5} - \frac{5}{8}$

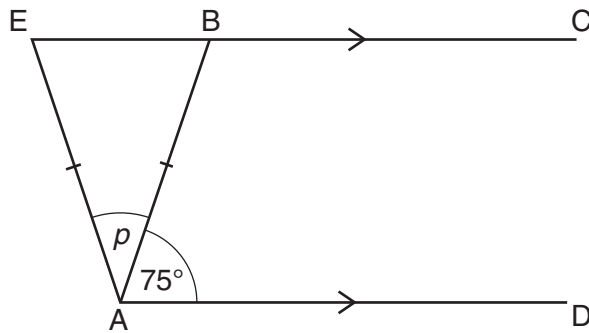
(a) _____ [2]

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

Give your answer as a mixed number in its simplest form.

(b) _____ [4]

- 8 EBC is parallel to AD.
Triangle ABE is isosceles with $AE = AB$.
Angle BAD is 75° .



Not to scale

Work out the size of angle p .

_____ $^\circ$ [3]

- 9 Emil makes chairs and stools.
Each chair has 4 legs and each stool has 3 legs.
Emil has made c chairs and t stools.
In total the chairs and stools have 76 legs.

This information gives the equation

$$4c + 3t = 76.$$

- (a) Emil has made a total of 22 chairs and stools.

Complete this equation to show this information.

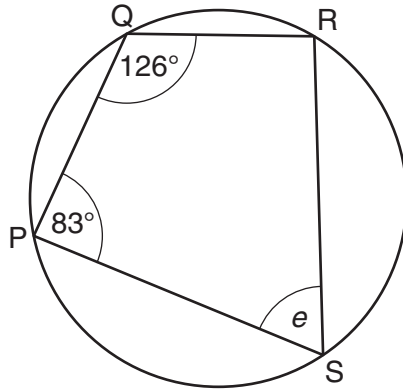
$$c + t = \boxed{} \quad [1]$$

- (b) Use algebra to solve these two equations simultaneously to find out how many chairs and how many stools Emil has made.

(b) chairs, $c =$ _____

stools, $t =$ _____ [3]

10 (a) P, Q, R and S are points on the circumference of a circle.

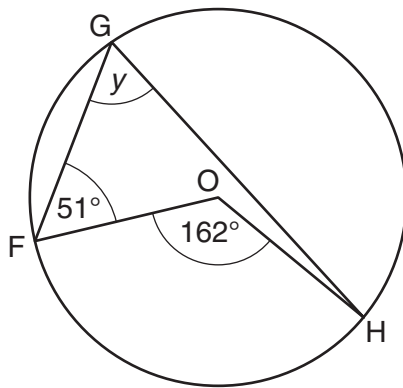


Not to scale

Work out the size of angle e .
Give a reason for your answer.

$e =$ _____ ° because _____
_____ [2]

(b) F, G and H are points on a circle, centre O.

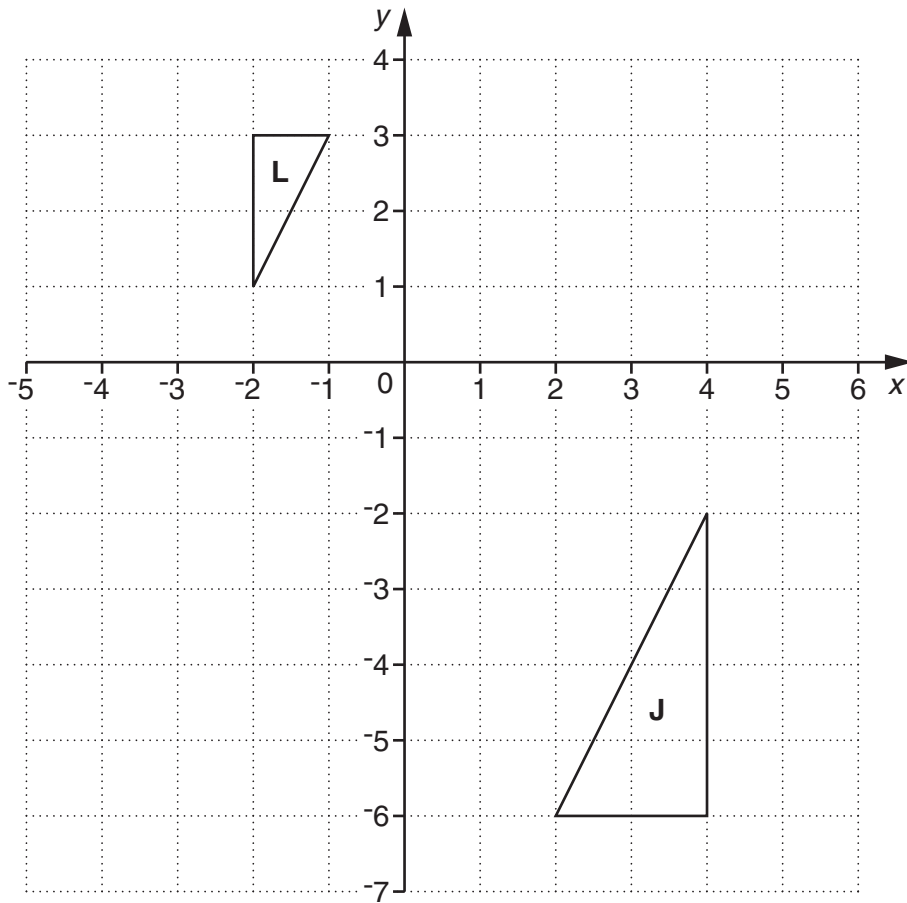


Not to scale

Work out the size of angle y .

(b) _____ ° [1]

11 Triangles **J** and **L** are drawn on the grid below.



(a) What is the scale factor of the enlargement that maps triangle **L** onto triangle **J**?

(a) _____ [1]

(b) Enlarge triangle **J** with scale factor $\frac{1}{2}$ and centre (4, 4).
Label your image **M**.

[3]

12 (a) Simplify fully.

$$\sqrt{\sqrt{12} \times \sqrt{3}}$$

(a) _____ [2]

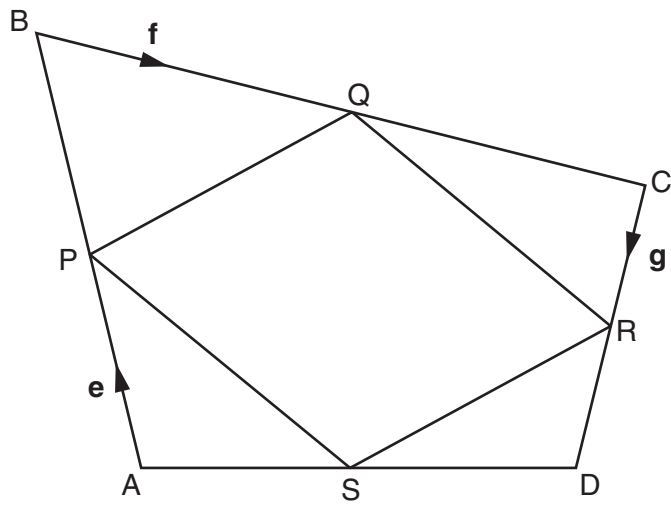
(b) Simplify by rationalising the denominator.

$$\frac{2}{\sqrt{5}}$$

(b) _____ [1]

- 13* ABCD is a quadrilateral.
The midpoints of AB, BC, CD and DA are P, Q, R and S respectively.

$$\overrightarrow{AB} = 2\mathbf{e}, \overrightarrow{BC} = 2\mathbf{f} \text{ and } \overrightarrow{CD} = 2\mathbf{g}.$$



Not to scale

By first finding the vector \overrightarrow{AD} in terms of \mathbf{e} , \mathbf{f} and \mathbf{g} , prove that PQRS is a parallelogram. [5]

END OF QUESTION PAPER

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