OCR
RECOGNISING ACHIEVEMENT

H

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

A50202

Candidate forename		Candidate surname	

Centre number					Candidate number				

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**.
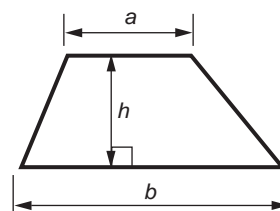* This document consists of **16** pages. Any blank pages are indicated.

WARNING

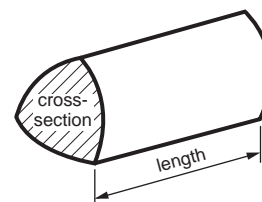No calculator can be used for this paper

This paper has been pre modified for carrier language

OCR is an exempt Charity

Turn over

2

Formulae Sheet: Higher Tier

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

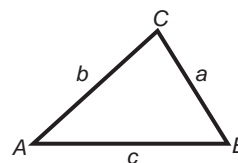**Volume of prism** = (area of cross-section) × length

In any triangle *ABC*

Sine rule $\quad \dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
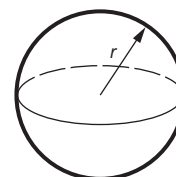
Cosine rule $\; a^2 = b^2 + c^2 - 2bc \cos A$

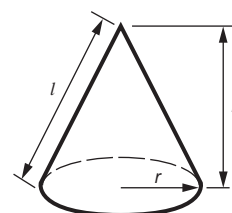**Area of triangle** $= \frac{1}{2} ab \sin C$

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

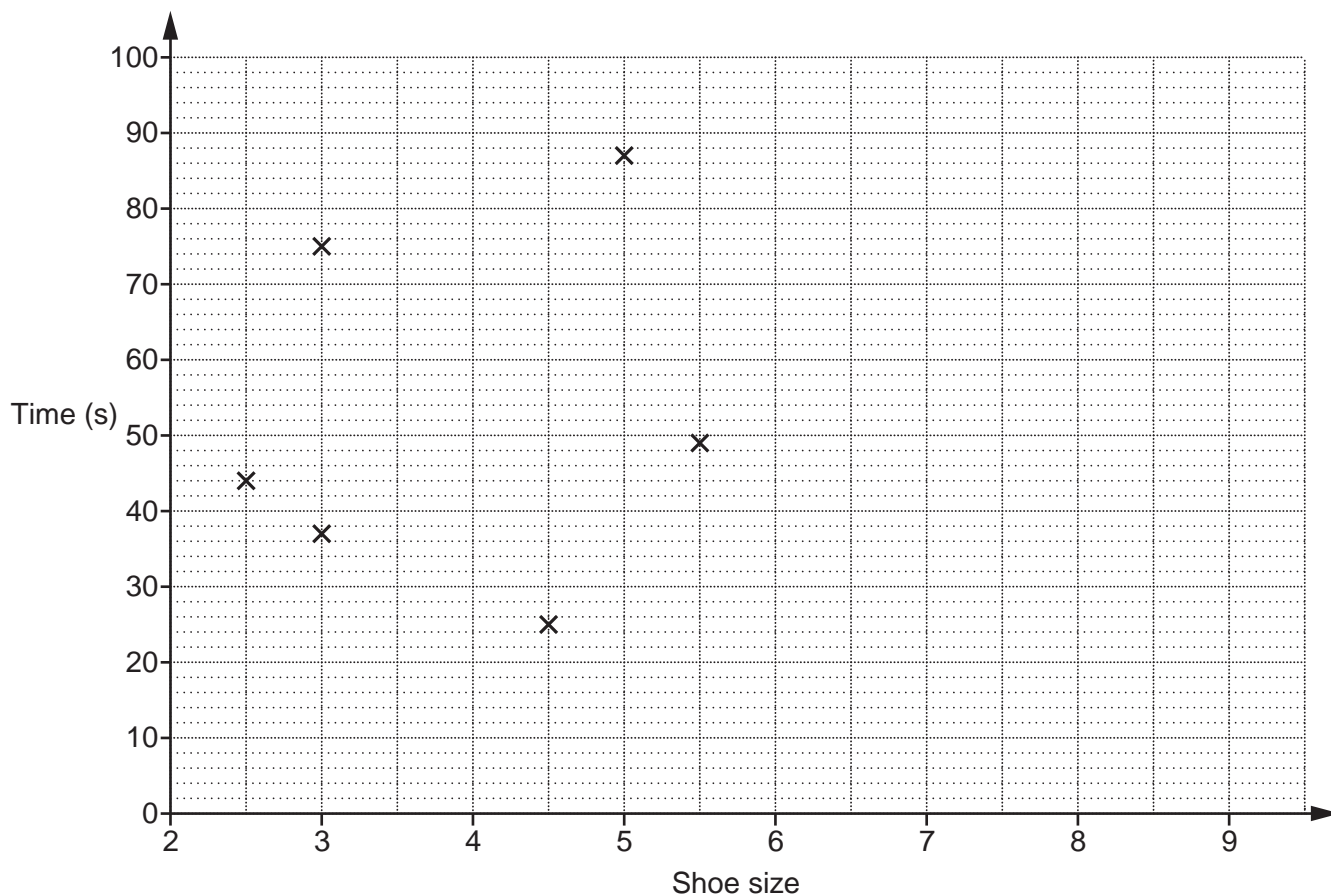The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

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

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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   No   Positive
correlation   correlation   correlation

[1]

4

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.
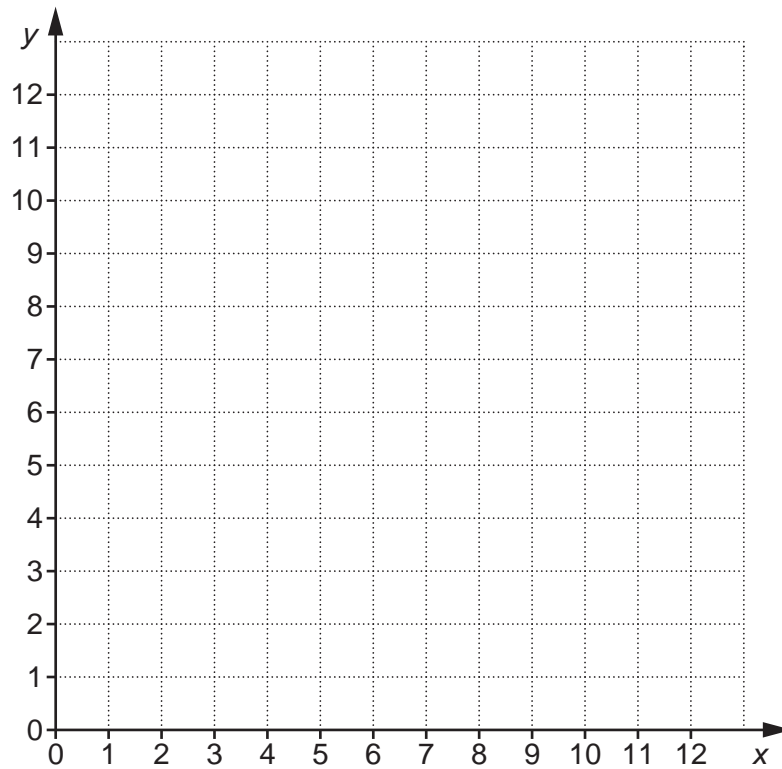
(a) _____ **[4]**

(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]**

5

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]**

Turn over

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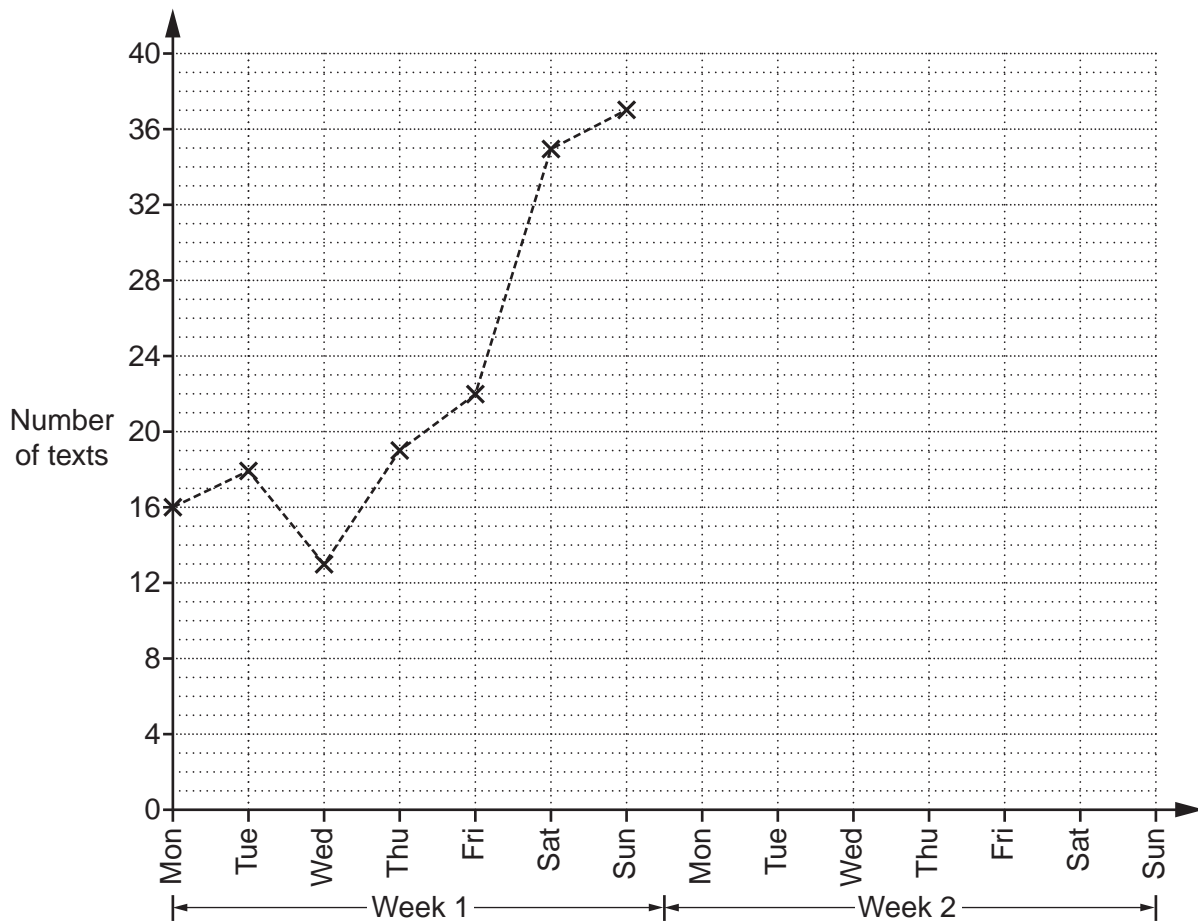
(a) Complete the time series graph up to and including Saturday of Week 2.
The data for Week 1 has already been plotted. **[2]**

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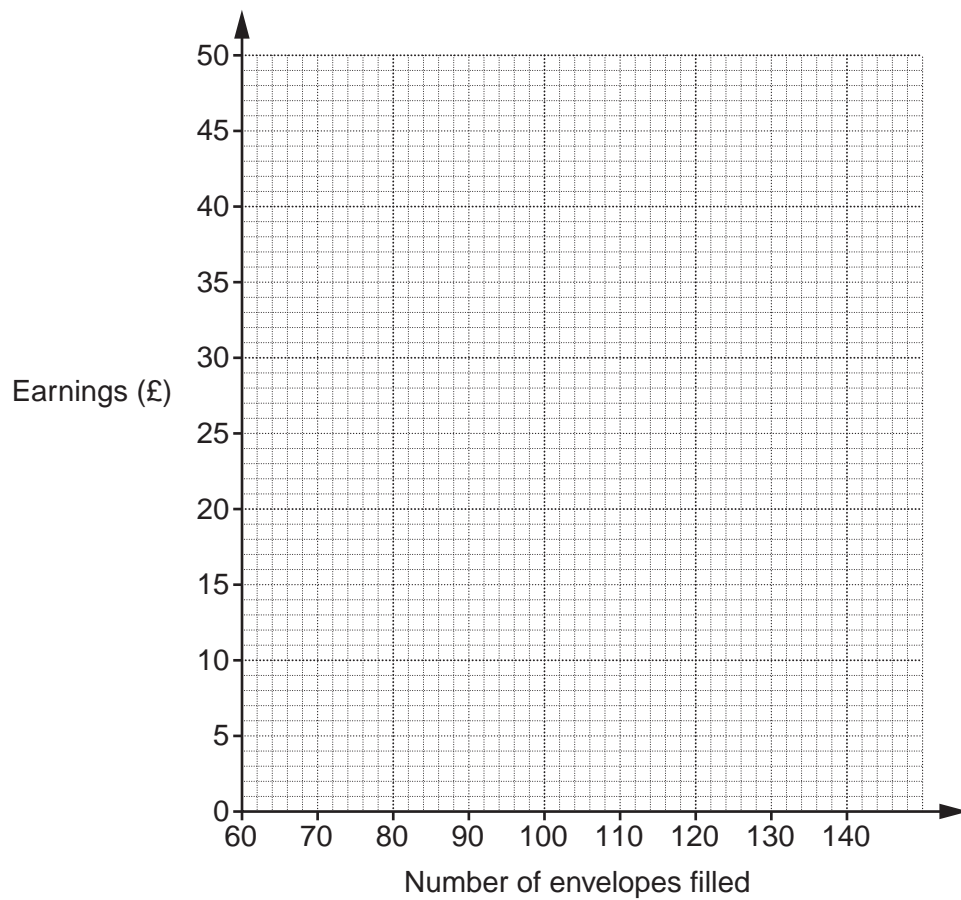
$$5n + 2 > 2n - 13$$

_____ **[3]**

8

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) $\dfrac{4}{5} - \dfrac{5}{8}$

(a) _____ **[2]**

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

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

(b) _____ **[4]**

    Turn over

8   EBC is parallel to AD.
     Triangle ABE is isosceles with AE = AB.
     Angle BAD is 75°.
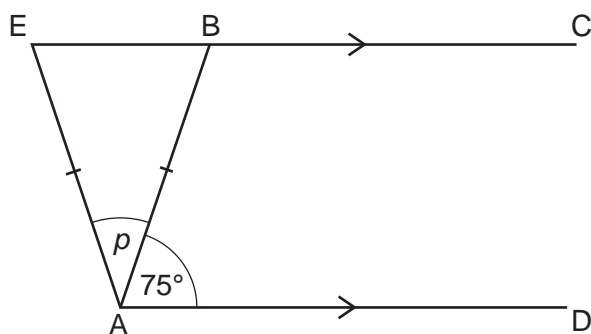
Not to scale

Work out the size of angle *p*.

_____ ° **[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.

$$c + t = \boxed{}$$ **[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.
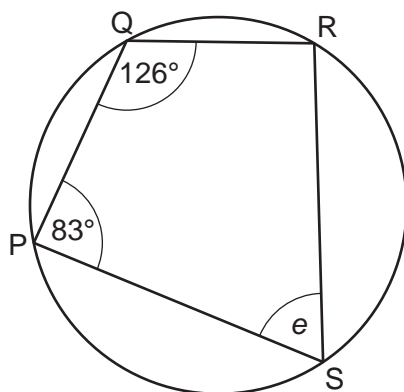
Not to scale

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

e = _____ ° because _____

_____ **[2]**

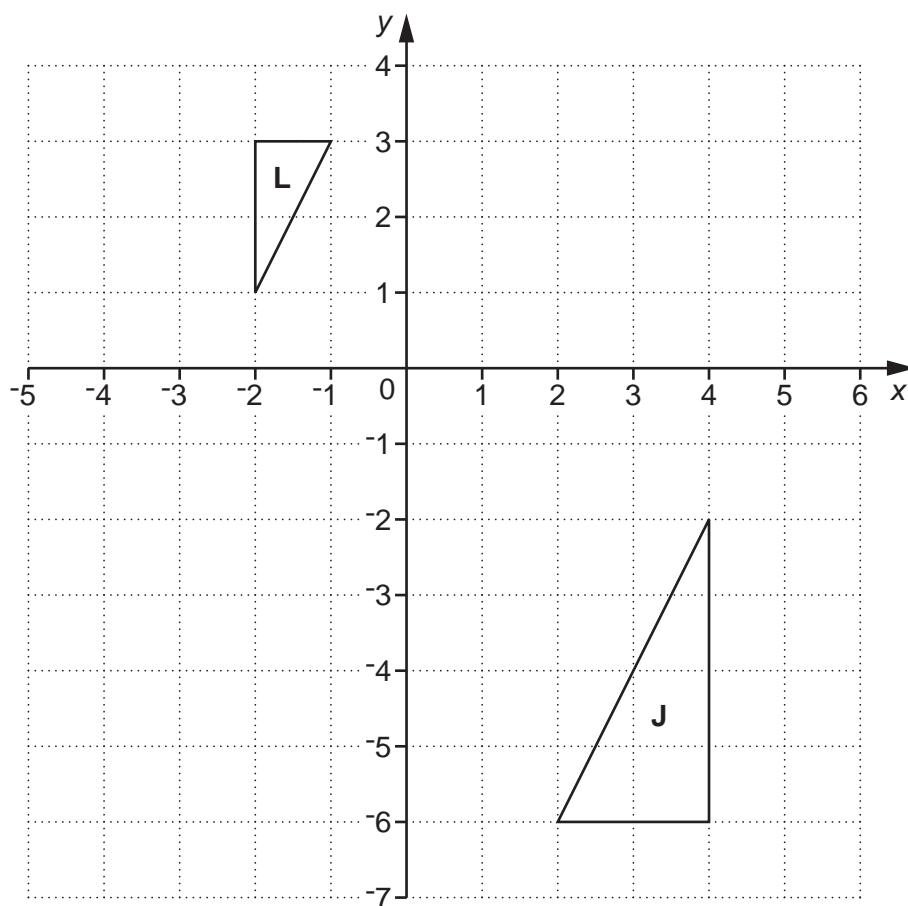**(b)** F, G and H are points on a circle, centre O.
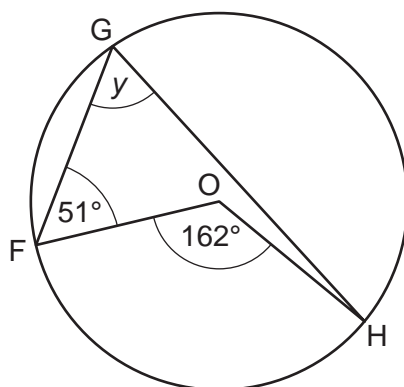
Not to scale

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]**

Turn over

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**e**, $\overrightarrow{BC}$ = 2**f** and $\overrightarrow{CD}$ = 2**g**.
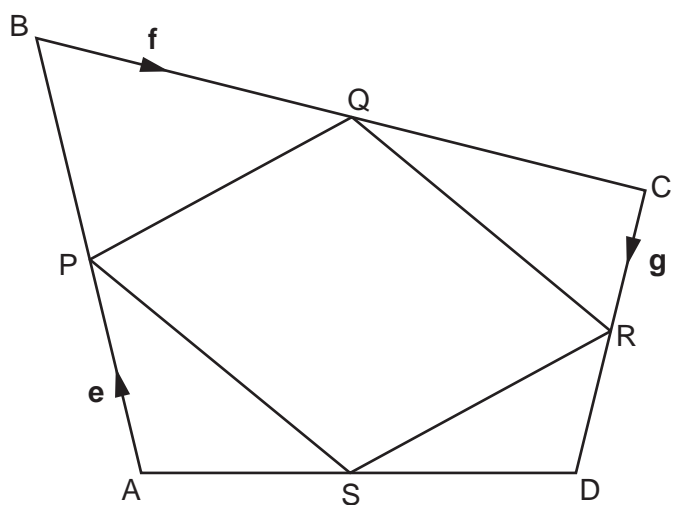
Not to scale

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

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