UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

9178372827

MATHEMATICS **0581/21**

Paper 2 (Extended) **May/June 2012**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **12** printed pages.

UNIVERSITY of CAMBRIDGE International Examinations

1 The price of a ticket for a football match is \$124 .

(a) Calculate the amount received when 76 500 tickets are sold.

Answer(a) \$ ..... [1]

(b) Write your answer to **part (a)** in standard form.

Answer(b) \$ ..... [1]

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2 Gregor changes \$700 into euros (€) when the rate is €1 = \$1.4131 .

Calculate the amount he receives.

Answer € ..... [2]

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3 Factorise completely.

$15p^2 + 24pt$

Answer ..... [2]

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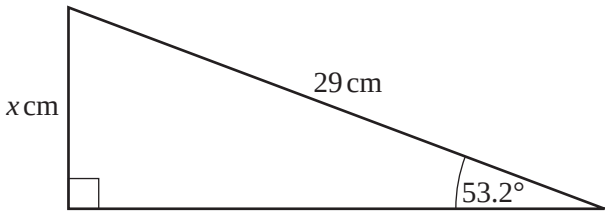
4 Write the following in order of size, **smallest** first.

$0.47 \qquad \frac{8}{17} \qquad \sqrt{0.22} \qquad \tan 25°$

Answer ..... < ..... < ..... < ..... [2]

5



NOT TO SCALE

Calculate the value of x.

Answer x = ... [2]

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6 Leon scores the following marks in 5 tests.

8 4 8 y 9

His mean mark is 7.2.

Calculate the value of y.

Answer y = ... [2]

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7 The sides of a rectangle are 6.3 cm and 4.8 cm, each correct to 1 decimal place.

Calculate the upper bound for the area of the rectangle.

Answer ..... cm^2 [2]

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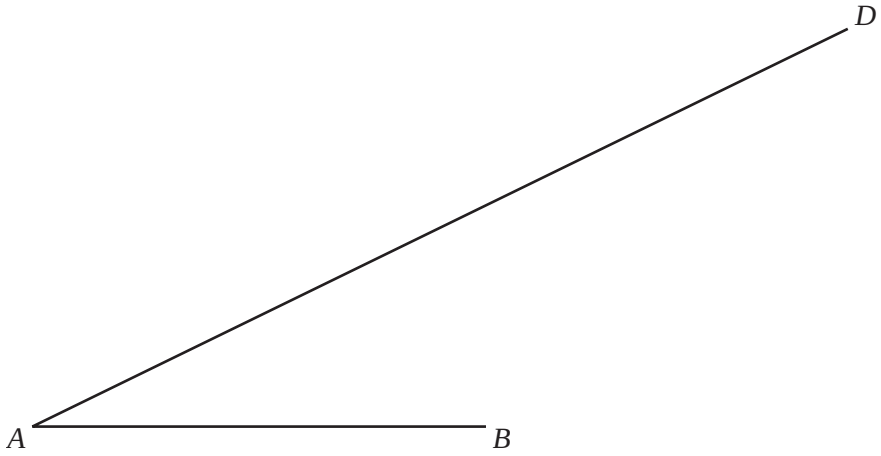
8 Find r when $(5)^{\frac{r}{3}} = 125$.

Answer r = ... [2]

9



(a) The point C lies on AD and angle $ABC = 67°$.

Draw accurately the line BC. [1]

(b) **Using a straight edge and compasses only**, construct the perpendicular bisector of AB.
Show clearly all your construction arcs. [2]

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10 Shania invests \$750 at a rate of $2\frac{1}{2}$ % per year simple interest.

Calculate the **total** amount Shania has after 5 years.

Answer \$ ..... [3]

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11 Solve the simultaneous equations.

$$3x + 5y = 24$$
$$x + 7y = 56$$

Answer $x =$ .....

$y =$ ..... [3]

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12 **Without using your calculator**, work out $1\frac{5}{6}+\frac{9}{10}$.

You must show your working and give your answer as a mixed number in its simplest form.

Answer ..... [3]

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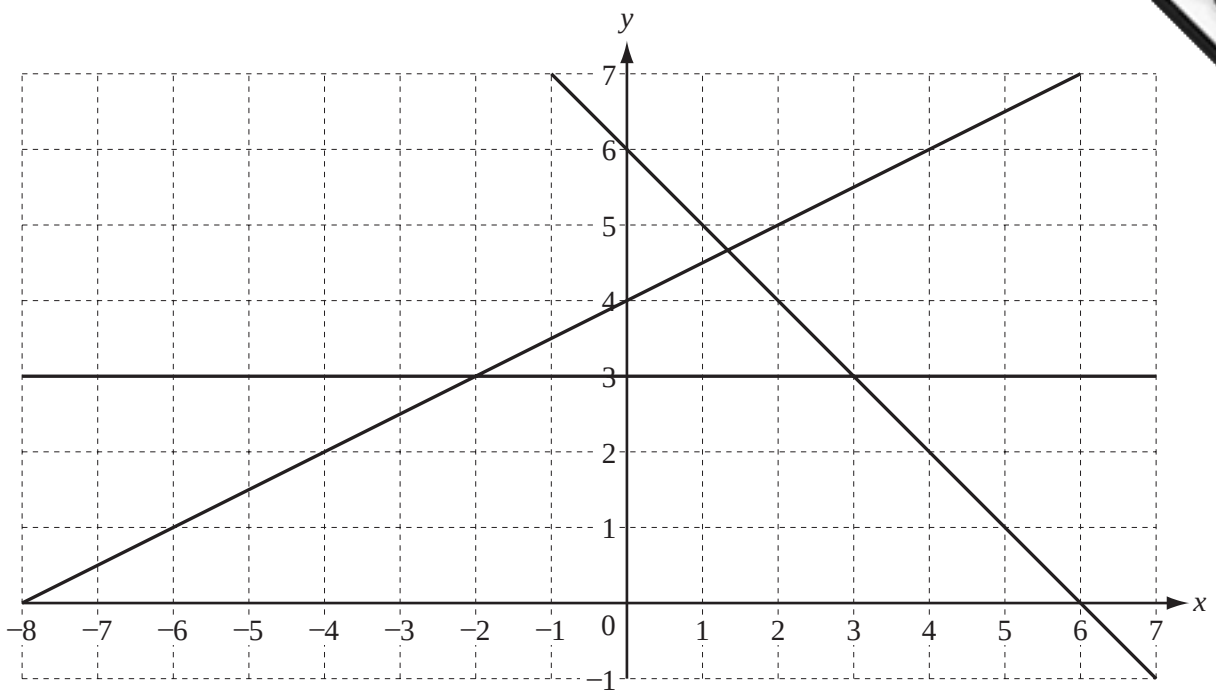
13 y is **inversely** proportional to x^2.
When $x = 4$, $y = 3$.

Find y when $x = 5$.

Answer $y =$ ..... [3]

14



The region ***R*** contains points which satisfy the inequalities

$$y \leqslant \frac{1}{2}x + 4, \qquad y \geqslant 3 \quad \text{and} \quad x + y \geqslant 6.$$

On the grid, label with the letter ***R*** the region which satisfies these inequalities.

You must shade the **unwanted** regions. [3]

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15 The scale of a map is 1 : 500 000 .

(a) The actual distance between two towns is 172 km.
Calculate the distance, in centimetres, between the towns on the map.

Answer(a) ..... cm [2]

(b) The area of a lake on the map is 12 cm^2.
Calculate the actual area of the lake in km^2.

Answer(b) ..... km^2 [2]

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16 $\mathbf{M} = \begin{pmatrix} 5 & 2 \\ -3 & 4 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} -1 & -2 \\ 2 & 6 \end{pmatrix}$

Calculate

(a) **MN**,

Answer(a) **MN** = [2]

(b) $\mathbf{M}^{-1}$, the inverse of **M**.

Answer(b) $\mathbf{M}^{-1}$ = [2]

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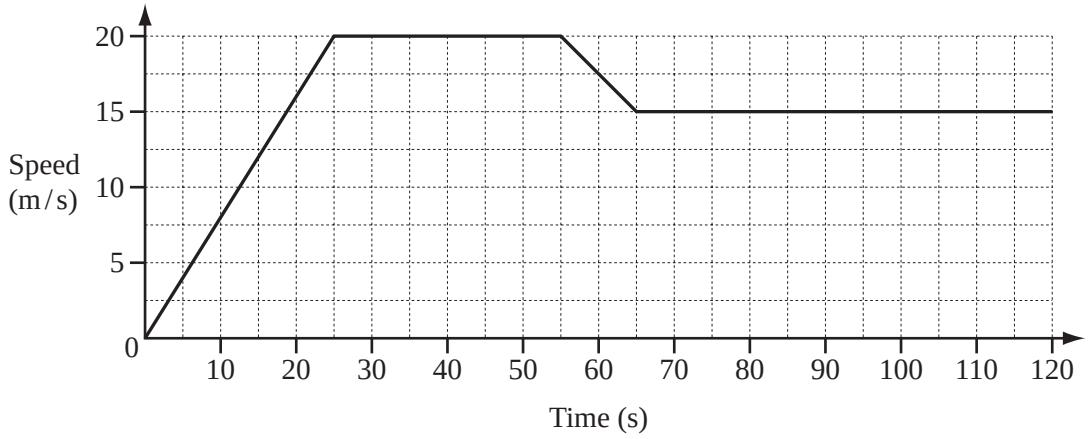
17 Make w the subject of the formula.

$$c = \frac{4 + w}{w + 3}$$

Answer w = ... [4]

18



The diagram shows the speed-time graph for the first 120 seconds of a car journey.

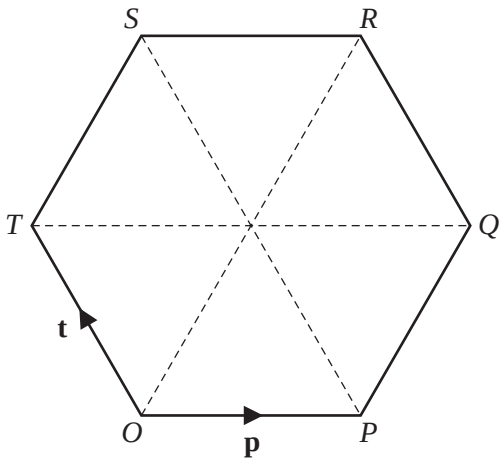
(a) Calculate the acceleration of the car during the first 25 seconds.

Answer(a) ..... m/s^2 [1]

(b) Calculate the distance travelled by the car in the first 120 seconds.

Answer(b) ..... m [4]

19



O is the origin and $OPQRST$ is a regular hexagon.

$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OT} = \mathbf{t}$.

Find, in terms of **p** and **t**, in their simplest forms,

(a) $\overrightarrow{PT}$,

Answer(a) $\overrightarrow{PT} =$ ..... [1]

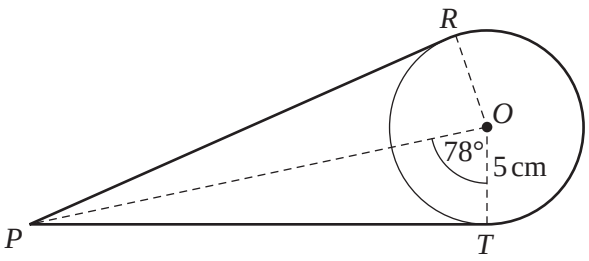
(b) $\overrightarrow{PR}$,

Answer(b) $\overrightarrow{PR} =$ ..... [2]

(c) the position vector of R.

Answer(c) ..... [2]

20



NOT TO
SCALE

R and *T* are points on a circle, centre *O*, with radius 5 cm.
PR and *PT* are tangents to the circle and angle *POT* = 78°.

A thin rope goes from *P* to *R*, around the major arc *RT* and then from *T* to *P*.

Calculate the length of the rope.

Answer ..... cm [6]

Question 21 is printed on the next page.

21 In this question, give all your answers as fractions.

A box contains 3 red pencils, 2 blue pencils and 4 green pencils.
Raj chooses 2 pencils at random, without replacement.

Calculate the probability that

(a) they are both red,

Answer(a) ..... [2]

(b) they are both the same colour,

Answer(b) ..... [3]

(c) exactly one of the two pencils is green.

Answer(c) ..... [3]