UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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|---|---|
| CANDIDATE NAME | |
| CENTRE NUMBER | CANDIDATE NUMBER |

*7153603197*

**MATHEMATICS** **0580/23**

Paper 2 (Extended) **October/November 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 $\pi$, 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.

*For Examiner's Use*

**1** Samantha invests \$600 at a rate of 2% per year simple interest.

Calculate the interest Samantha earns in 8 years.

*Answer* \$ ..... [2]

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**2** Show that $\left(\frac{1}{10}\right)^2 + \left(\frac{2}{5}\right)^2 = 0.17$.

Write down all the steps in your working.

*Answer*

[2]

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**3** Jamie needs 300 g of flour to make 20 cakes.

How much flour does he need to make 12 cakes?

*Answer* ..... g [2]

---

**4** Expand the brackets.

$$y(3 - y^3)$$

*Answer* ..... [2]

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*For Examiner's Use*

**5** Maria pays \$84 rent.
The rent is increased by 5%.

Calculate Maria's new rent.

*Answer* \$ ..... [2]

---

**6**


**Using a straight edge and compasses only,** construct the locus of points which are equidistant from *R* and from *T*. [2]

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**7** Find the value of $\dfrac{7.2}{11.8 - 10.95}$.

Give your answer correct to 4 significant figures.

*Answer* ..... [2]

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**8** A carton contains 250 ml of juice, correct to the nearest millilitre.

Complete the statement about the amount of juice, $j$ ml, in the carton.

*Answer* ..... $\leqslant j <$ ..... [2]

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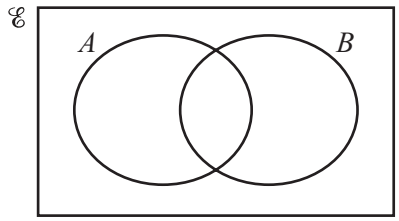
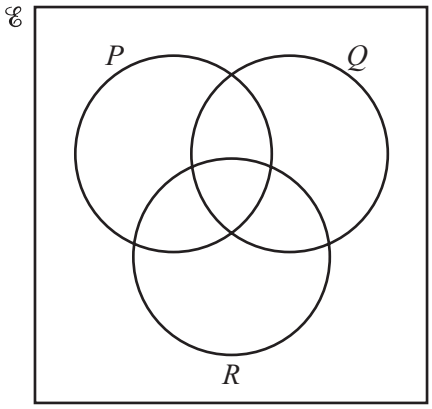
**9** Shade the required region in each of the Venn diagrams.






$A'$




$(P \cap R) \cup Q$

[2]

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**10** Without using a calculator, show that $\left(\frac{49}{16}\right)^{-\frac{3}{2}} = \frac{64}{343}$.

Write down all the steps in your working.

*Answer*

[2]

---

**11** Simplify $(256w^{256})^{\frac{1}{4}}$.

*Answer* ..... [2]

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**12**

| Mass of parcel ($m$ kilograms) | $0 < m \leqslant 0.5$ | $0.5 < m \leqslant 1.5$ | $1.5 < m \leqslant 3$ |
|---|---|---|---|
| Frequency | 20 | 18 | 9 |

The table above shows information about parcels in a delivery van.

John wants to draw a histogram using this information.
Complete the table below.

| Mass of parcel ($m$ kilograms) | $0 < m \leqslant 0.5$ | $0.5 < m \leqslant 1.5$ | $1.5 < m \leqslant 3$ |
|---|---|---|---|
| Frequency density | | 18 | |

[2]

**13** Write the following as a single fraction in its simplest form.

$$\frac{x+2}{3} - \frac{2x-1}{4} + 1$$

*Answer* ..... [3]

*For Examiner's Use*

**14** $y$ varies inversely as the square root of $x$.
When $x = 9$, $y = 6$.

Find $y$ when $x = 36$.

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

---

**15** A model of a ship is made to a scale of 1 : 200.
The surface area of the model is 7500 $cm^2$.

Calculate the surface area of the ship, giving your answer in square metres.

*Answer* ..... $m^2$ [3]

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**16** Make $y$ the subject of the formula.

$$A = \pi x^2 - \pi y^2$$

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

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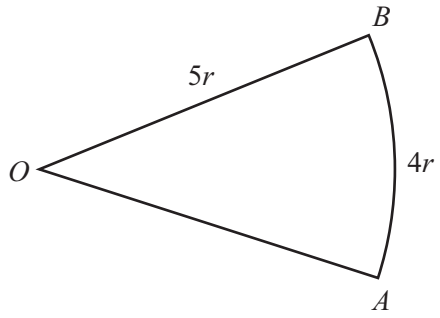
**17**




NOT TO SCALE

The diagram shows a sector of a circle, centre $O$, radius $5r$.
The length of the arc $AB$ is $4r$.

Find the area of the sector in terms of $r$, giving your answer in its simplest form.

*Answer* .....  [3]

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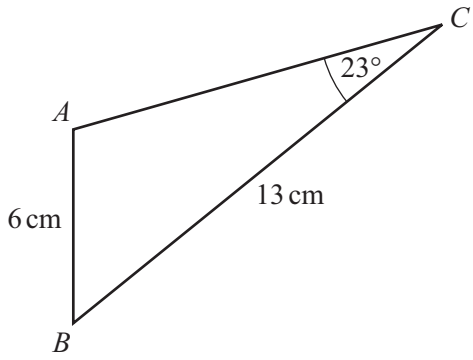
**18**




NOT TO SCALE

In triangle $ABC$, $AB = 6$ cm, $BC = 13$ cm and angle $ACB = 23°$.
Calculate angle $BAC$, which is obtuse.

*Answer* Angle $BAC$ = .....  [4]

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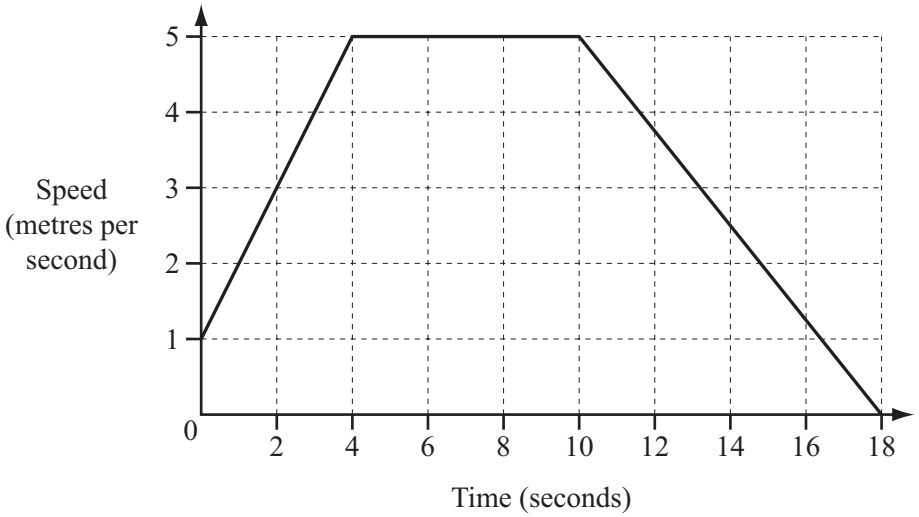
**19**






The diagram shows the speed-time graph for the last 18 seconds of Roman's cycle journey.

**(a)** Calculate the deceleration.

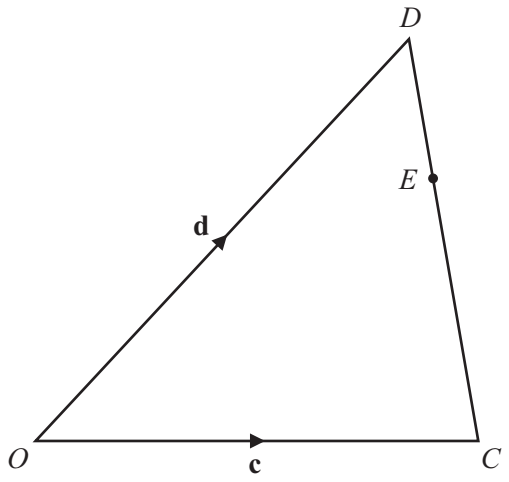
*Answer(a)* ..... $m/s^2$ [1]

**(b)** Calculate the total distance Roman travels during the 18 seconds.

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

**20**






NOT TO SCALE

In the diagram, $O$ is the origin.
$\overrightarrow{OC}$ = **c** and $\overrightarrow{OD}$ = **d**.
$E$ is on $CD$ so that $CE = 2ED$.

Find, in terms of **c** and **d**, in their simplest forms,

**(a)** $\overrightarrow{DE}$,

*Answer(a)* $\overrightarrow{DE}$ = ..... [2]

**(b)** the position vector of $E$.

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



**[Turn over**

**21** Simplify the following.

$$\frac{h^2 - h - 20}{h^2 - 25}$$

*For Examiner's Use*

*Answer* ..... [4]

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**22** **(a)** $\mathbf{M} = \begin{pmatrix} 3 & 2 \\ -1 & 1 \end{pmatrix}$

Find $\mathbf{M}^{-1}$, the inverse of $\mathbf{M}$.

*Answer(a)* $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

**(b)** $\mathbf{D}$, $\mathbf{E}$ and $\mathbf{X}$ are $2 \times 2$ matrices.
$\mathbf{I}$ is the identity $2 \times 2$ matrix.

**(i)** Simplify $\mathbf{DI}$.

*Answer(b)*(i) ..... [1]

**(ii)** $\mathbf{DX} = \mathbf{E}$
Write $\mathbf{X}$ in terms of $\mathbf{D}$ and $\mathbf{E}$.

*Answer(b)*(ii) $\mathbf{X}$ = ..... [1]

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**23** $f(x) = 3x + 5$ $g(x) = 4x - 1$

*For Examiner's Use*

**(a)** Find the value of gg(3).

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

**(b)** Find fg($x$), giving your answer in its simplest form.

*Answer(b)* fg($x$) = ..... [2]

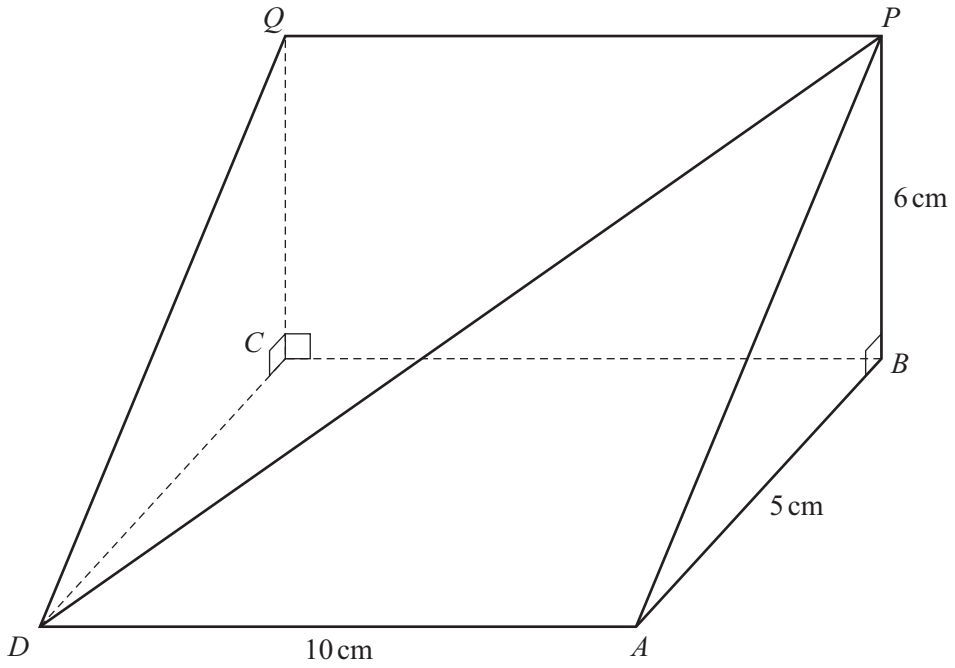
**(c)** Solve the equation.

$f^{-1}(x) = 11$

*Answer(c)* $x$ = ..... [1]

**Question 24 is printed on the next page.**

**24**




NOT TO SCALE

*For Examiner's Use*

The diagram shows a triangular prism.
*ABCD* is a horizontal rectangle with $DA = 10$ cm and $AB = 5$ cm.
*BCQP* is a vertical rectangle and $BP = 6$ cm.

Calculate

**(a)** the length of *DP*,

*Answer(a) DP =* ..... cm [3]

**(b)** the angle between *DP* and the horizontal rectangle *ABCD*.

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