UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

7561576524

MATHEMATICS **0581/23**

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

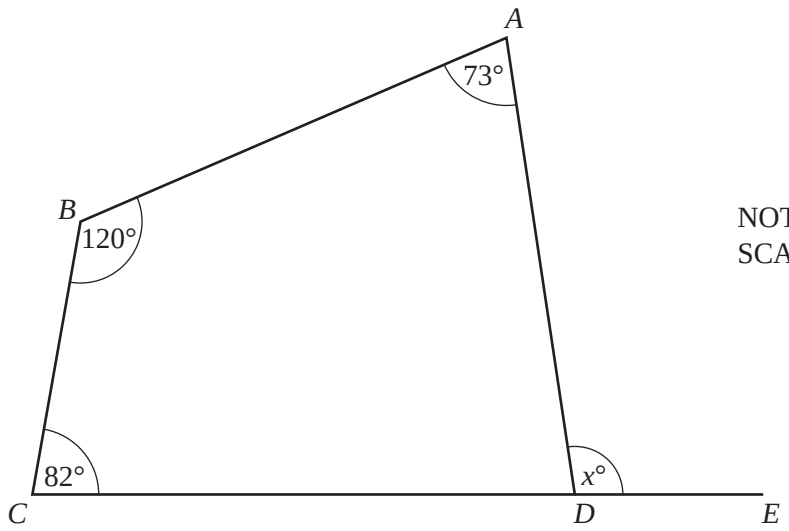
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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.

1



NOT TO
SCALE

The diagram shows a quadrilateral *ABCD*.
CDE is a straight line.

Calculate the value of x.

Answer $x =$ ..... [2]

---

2 Hans invests \$750 for 8 years at a rate of 2% per year simple interest.

Calculate the interest Hans receives.

Answer \$ ..... [2]

---

3 **(a)** Calculate $\sqrt[3]{7^{1.5} + 22^{0.9}}$ and write down your full calculator display.

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

(b) Write your answer to **part (a)** correct to 4 significant figures.

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

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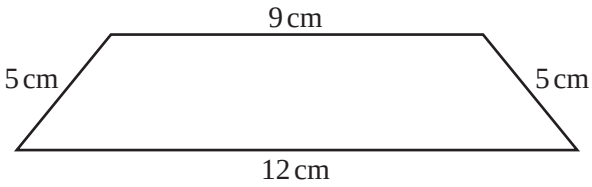
4 Solve the inequality.

$$3y + 7 \leqslant 2 - y$$

Answer ..... [2]

5



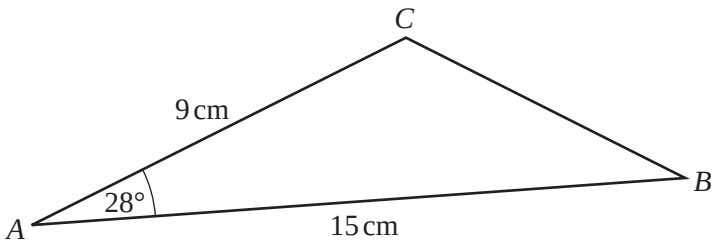
NOT TO SCALE

The diagram shows a quadrilateral.
The lengths of the sides are given to the nearest centimetre.

Calculate the upper bound of the perimeter of the quadrilateral.

Answer ..... cm [2]

6



NOT TO SCALE

Calculate the area of triangle *ABC*.

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

7

Height (h cm)	$0 < h \leqslant 10$	$10 < h \leqslant 15$	$15 < h \leqslant 30$
Frequency	25	u	9
Frequency density	2.5	4.8	v

The table shows information about the heights of some flowers.

Calculate the values of u and v.

Answer $u =$ .....

$v =$ ..... [2]

---

8 During her holiday, Hannah rents a bike.
She pays a fixed cost of \$8 and then a cost of \$4.50 per day.
Hannah pays with a \$50 note and receives \$10.50 change.

Calculate for how many days Hannah rents the bike.

Answer ..... days [3]

---

9 Make w the subject of the formula.

$$t = 2 - \frac{3w}{a}$$

Answer $w =$ ..... [3]

---

10 The periodic time, T, of a pendulum varies directly as the square root of its length, l.
$T = 6$ when $l = 9$.

Find T when $l = 25$.

Answer $T =$ ..... [3]

---

11 Boris invests \$280 for 2 years at a rate of 3% per year compound interest.

Calculate the interest Boris receives at the end of the 2 years.
Give your answer correct to 2 decimal places.

Answer \$ ..... [4]

---

12 **Without using your calculator**, work out the following.
Show all the steps of your working and give each answer as a fraction in its simplest form.

(a) $\frac{11}{12} - \frac{1}{3}$

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

(b) $\frac{1}{4} \div \frac{11}{13}$

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

---

13 **(a)** Find the value of $7p - 3q$ when $p = 8$ and $q = -5$.

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

(b) Factorise completely.

$3uv + 9vw$

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

---

14 Simplify the following.

(a) $(4pq^2)^3$

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

(b) $(16x^8)^{-\frac{1}{4}}$

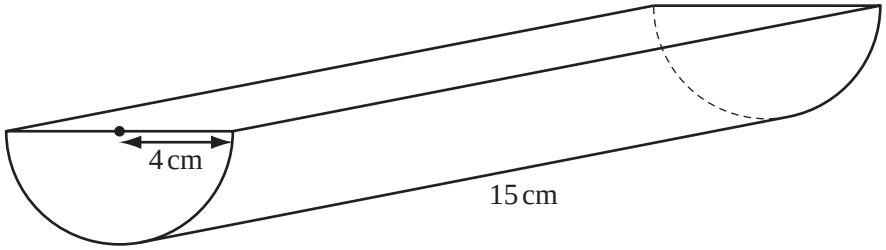
Answer(b) ..... [2]

---

15 Solve the equation $2x^2 + 6x - 3 = 0$.
Show your working and give your answers correct to 2 decimal places.

Answer $x =$ ..... or $x =$ ..... [4]

16



NOT TO SCALE

The diagram shows a **solid** prism of length 15 cm.
The cross-section of the prism is a semi-circle of radius 4 cm.

Calculate the total surface area of the prism.

Answer ..... cm^2 [4]

---

17 $\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & 2 \end{pmatrix}$

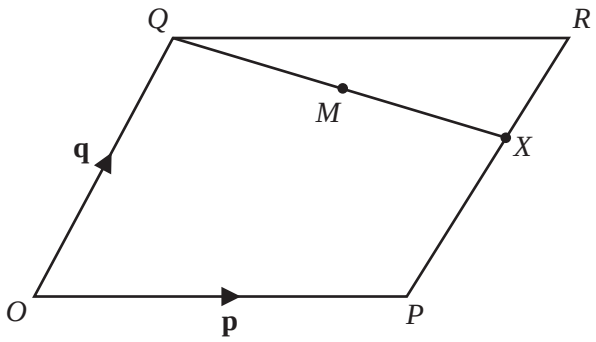
(a) Calculate **BA**.

Answer(a) [2]

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

Answer(b) [2]

18



NOT TO SCALE

O is the origin and *OPRQ* is a parallelogram.
The position vectors of *P* and *Q* are **p** and **q**.
X is on *PR* so that $PX = 2XR$.

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

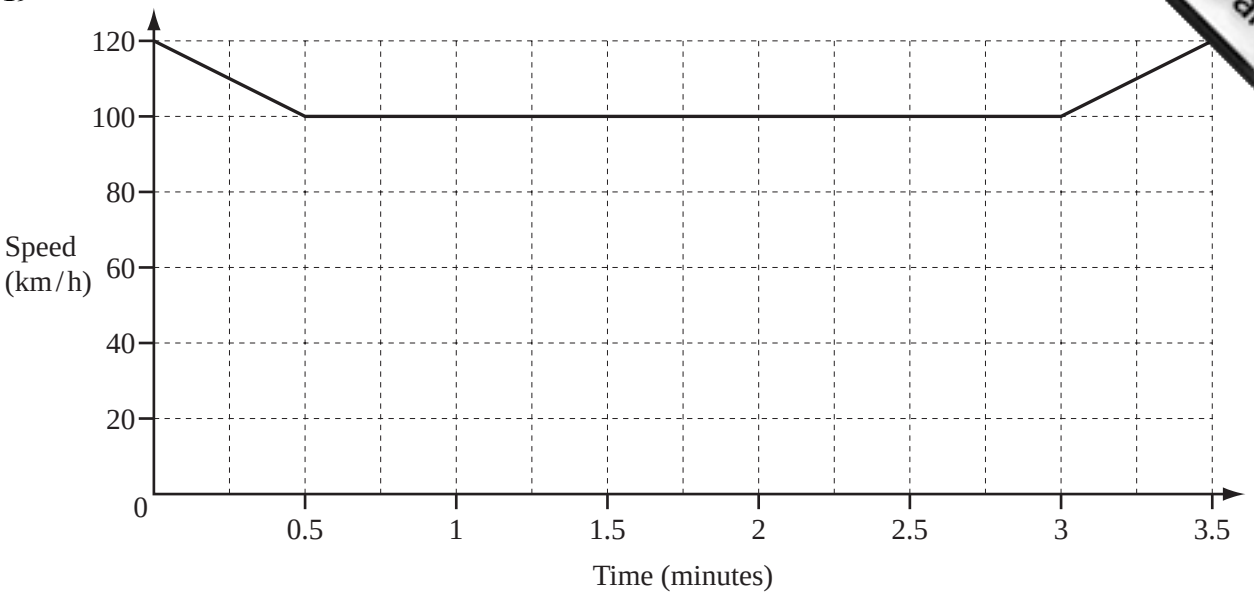
(a) $\overrightarrow{QX}$,

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

(b) the position vector of *M*, the midpoint of *QX*.

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

19



The diagram shows the speed-time graph for part of a car journey.
The speed of the car is shown in kilometres/**hour**.

Calculate the distance travelled by the car during the 3.5 **minutes** shown in the diagram.
Give your answer in kilometres.

Answer ..... km [4]

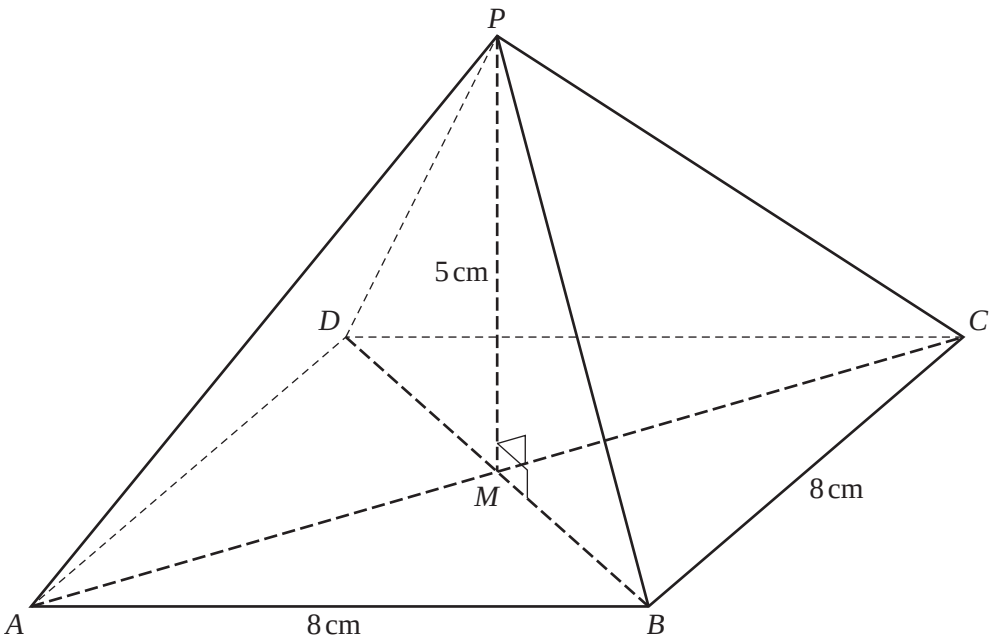
20 Simplify fully.

$$\frac{x^2 - x - 20}{x^3 - 10x^2 + 25x}$$

Answer ..... [5]

Question 21 is printed on the next page.

21



NOT TO SCALE

The diagram shows a pyramid on a square base *ABCD*.
The diagonals of the base, *AC* and *BD*, intersect at *M*.
The sides of the square are 8 cm and the vertical height of the pyramid, *PM*, is 5 cm.

Calculate

(a) the length of the edge *PB*,

Answer(a) PB = ... cm [3]

(b) the angle between *PB* and the base *ABCD*.

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