Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

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

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

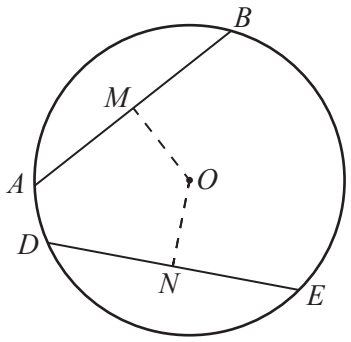
Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees 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.

1 Write 23 000 in standard form.

..... [1]

2



NOT TO SCALE

The diagram shows a circle, centre O.
AB and DE are chords of the circle.
M is the mid-point of AB and N is the mid-point of DE.
$AB = DE = 9$ cm and $OM = 5$ cm.

Find ON.

$ON =$ ..... cm [1]

3 Calculate $0.125^{-\frac{2}{3}}$.

..... [1]

4 Expand.

$$2x(3-x^2)$$

..... [2]

5 **Without using a calculator**, work out $\frac{1}{15}+\frac{2}{5}$.

Write down all the steps of your working and give your answer as a fraction in its simplest form.

..... [2]

6 Solve.

$$7m - 2 \geqslant 19$$

..... [2]

7 $C = \{x : x \text{ is an integer and } 5 < x < 12\}$ $D = \{5, 10\}$

(a) Put a ring around the correct statement from the list below.

$D = \varnothing$ $C \cap D = \{10\}$ $6 \in D$ $D \subset C$ [1]

(b) Find $\text{n}(C \cup D)$.

..... [1]

8 Factorise.

$$xy + 5y + 2x + 10$$

..... [2]

9 There are 30 000 lions in Africa.
The number of lions in Africa decreases exponentially by 2% each year.

Find the number of lions in Africa after 6 years.
Give your answer correct to the nearest hundred.

..... [2]

10 Find the mid-point of AB where $A = (w, r)$ and $B = (3w, t)$.
Give your answer in its simplest form in terms of w, r and t.

(..... , ...) [2]

11 An equilateral triangle has side length 12 cm, correct to the nearest centimetre.

Find the lower bound and the upper bound of the perimeter of the triangle.

Lower bound = ... cm

Upper bound = ... cm [2]

12 $x°$ is an **obtuse** angle and $\sin x° = 0.43$.

Find the value of x.

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

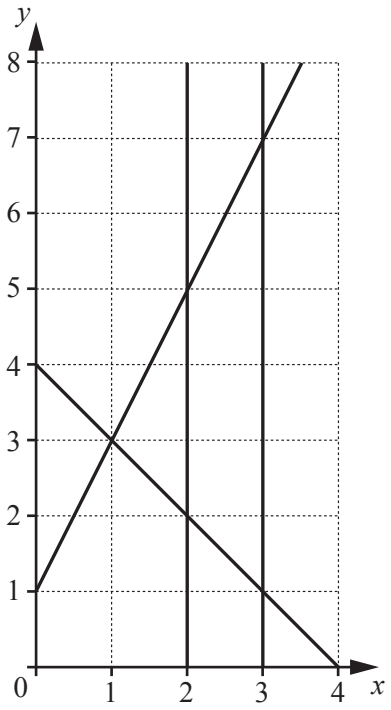
13 These are the first five terms of a sequence.

$-4 \quad 2 \quad 8 \quad 14 \quad 20$

Find an expression for the nth term of this sequence.

..... [2]

14



By shading the **unwanted** regions of the grid, find and label the region R that satisfies the following four inequalities.

$$x \leqslant 3 \qquad x \geqslant 2 \qquad y \leqslant 2x+1 \qquad y \geqslant 4-x$$

[3]

15 $\mathbf{M} = \begin{pmatrix} 5 & -3 \\ -1 & 2 \end{pmatrix}$

(a) Find $3\mathbf{M}$.

$3\mathbf{M} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

(b) Find $\mathbf{M}^{-1}$.

$\mathbf{M}^{-1} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

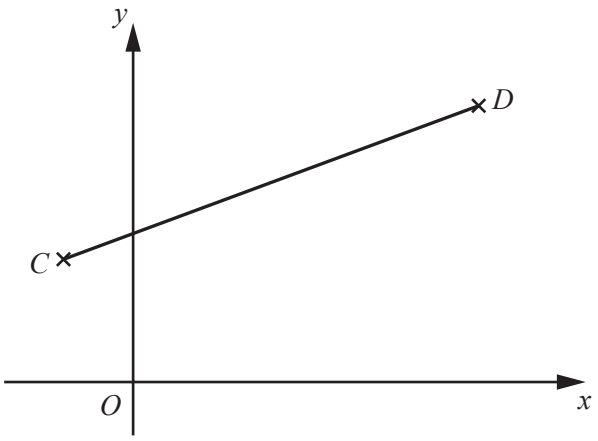
16 $x^2 - 12x + a = (x + b)^2$

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

17



NOT TO SCALE

The diagram shows the points $C(-1, 2)$ and $D(9, 7)$.

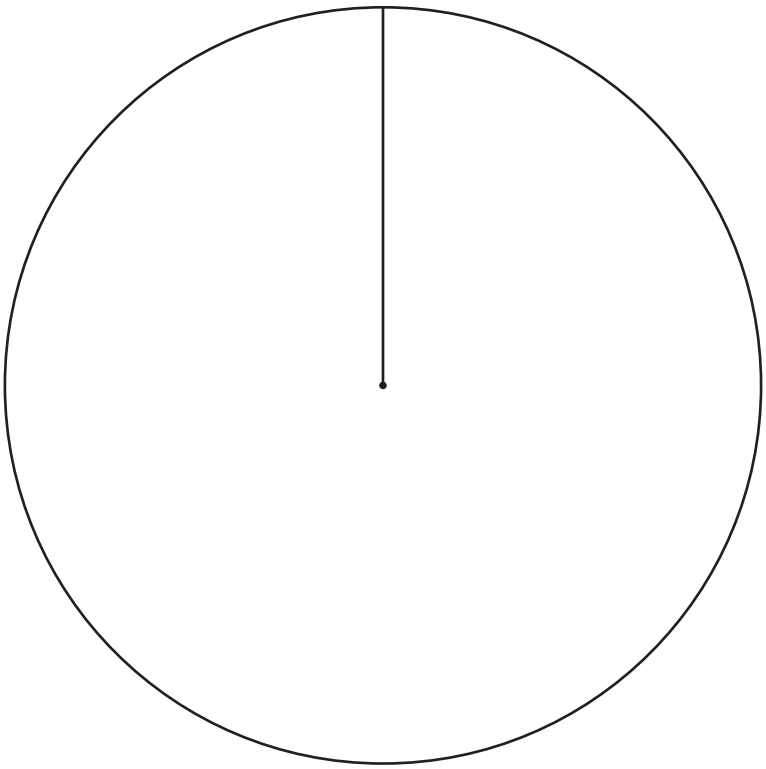
Find the equation of the line perpendicular to CD that passes through the point $(1, 3)$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

18 120 students choose what they want to do when they leave school.
Their choices are shown in the table.

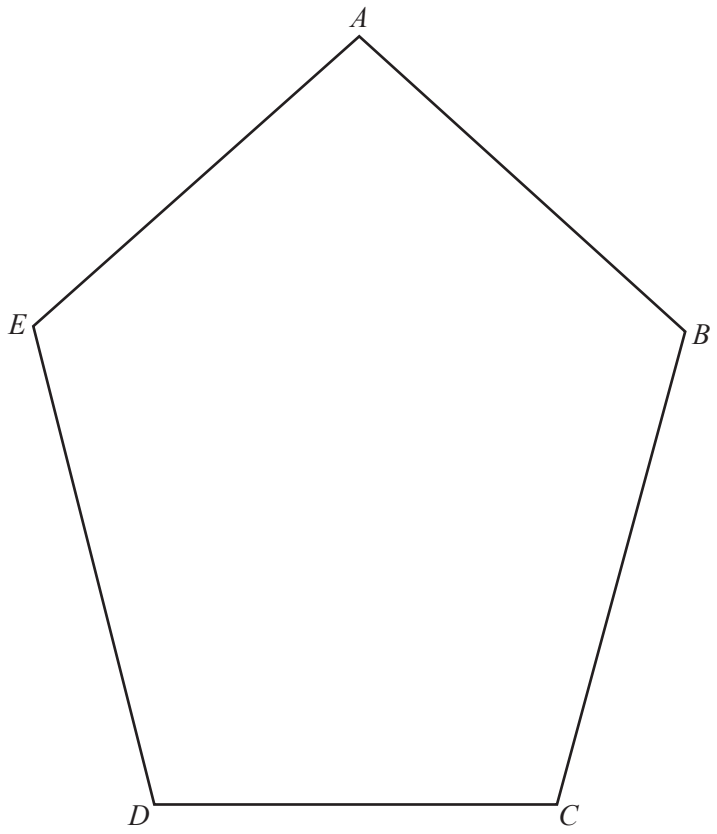
Choice	Number of students
University	57
Training	45
Work	18

Complete the pie chart to show this information.
Label each sector clearly.



[4]

19 The diagram shows a pentagon *ABCDE*.



(a) **Using a straight edge and compasses only**, construct the bisector of angle *BCD*. [2]

(b) Draw the locus of the points inside the pentagon that are 3 cm from *E*. [1]

(c) Shade the region inside the pentagon that is

- less than 3 cm from *E*

and

- nearer to *DC* than to *BC*.

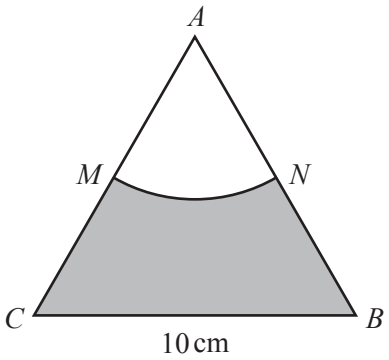
[1]

20 Make m the subject of the formula.

$$x = \frac{3m}{2-m}$$

$m =$ ..... [4]

21



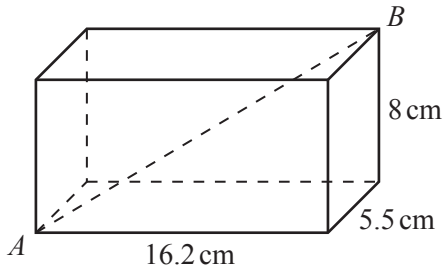
NOT TO SCALE

The diagram shows an equilateral triangle ABC with sides of length 10 cm.
AMN is a sector of a circle, centre A.
M is the mid-point of AC.

Work out the area of the shaded region.

..... cm^2 [4]

22



NOT TO SCALE

The diagram shows a cuboid with dimensions 5.5 cm, 8 cm and 16.2 cm.

Calculate the angle between the line AB and the horizontal base of the cuboid.

..... [4]

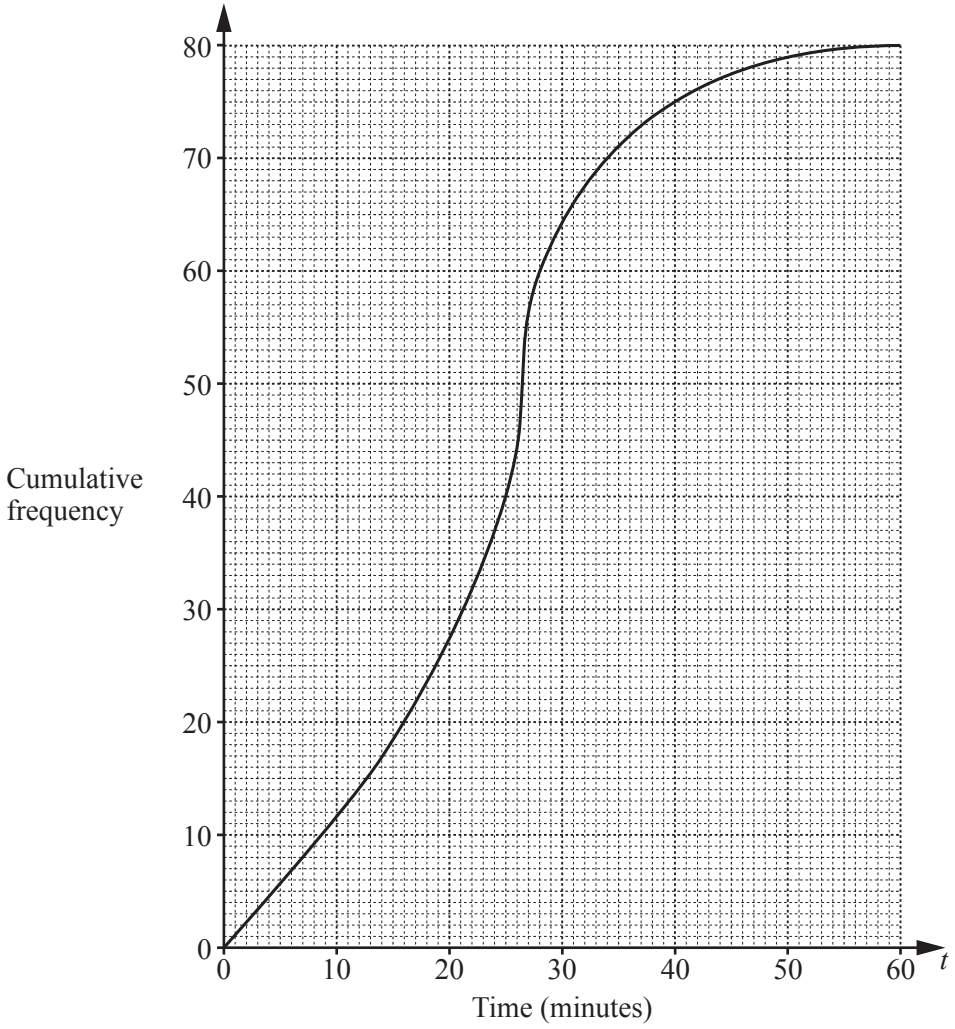
23 **(a)** Write 56 as a product of its prime factors.

..... [2]

(b) Find the lowest common multiple (LCM) of 56 and 42.

..... [2]

24 The time, t minutes, 80 students each spend completing their homework is recorded.
The cumulative frequency diagram shows the results.



Use the cumulative frequency diagram to find an estimate of

(a) the median,

..... min [1]

(b) the interquartile range,

..... min [2]

(c) the number of students who spend more than 40 minutes completing their homework.

..... [2]

Question 25 is printed on the next page.

25 **(a)** $f(x) = x^3$ $g(x) = 5x + 2$

(i) Find $gf(x)$.

..... [1]

(ii) Find $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [2]

(b) $h(x) = ax^2 + 1$

Find the value of a when $h(-2) = 21$.

$a =$ ..... [2]