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0580/23

May/June 2019

1 hour 30 minutes

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

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 70.

This document consists of **15** printed pages and **1** blank page.

- 1 Write 1.8972 correct to 2 decimal places.

..... [1]

- 2 Factorise $2x^2 - x$.

..... [1]

- 3 Giulio's reaction times are measured in two games.
 In the first game his reaction time is $\frac{1}{3}$ of a second.
 In the second game his reaction time is $\frac{1}{8}$ of a second.
 Find the difference between the two reaction times.

..... s [1]

- 4 The table shows the different methods of travel for 20 people going to work.

Method of travel	Frequency
Car	10
Walk	5
Bike	3
Bus	2

Which type of average, mean, median or mode, can be used for this information?

..... [1]

- 5 (a) Find the co-ordinates of the point where the line $y = 3x - 8$ crosses the y -axis.

(.....,) [1]

- (b) Write down the gradient of the line $y = 3x - 8$.

..... [1]

- 6 Calculate.

- (a) $-12 \div -2$

..... [1]

- (b) $\sqrt[3]{2^3 + 2}$

..... [1]

- 7 Here is a list of numbers.

21

$\frac{2}{3}$

$\sqrt{13}$

31

$\sqrt{121}$

51

0.7

From this list, write down

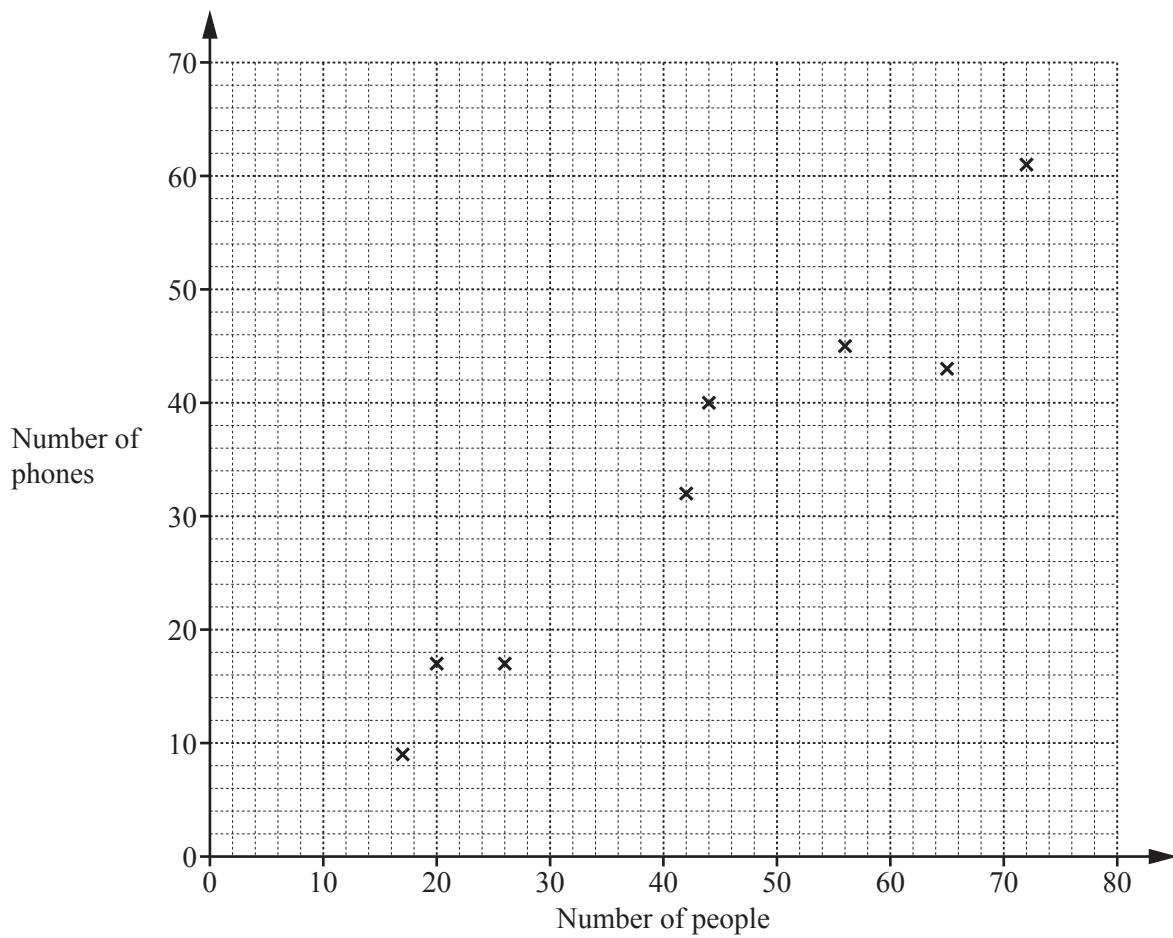
- (a) a prime number,

..... [1]

- (b) an irrational number.

..... [1]

- 8 The scatter diagram shows the number of people and the number of phones in each of 8 buildings.



- (a) One of the buildings contains 42 people.

Write down the number of phones in this building.

..... [1]

- (b) What type of correlation is shown in the scatter diagram?

..... [1]

- 9 Without using a calculator, work out $\frac{12}{35} \times \frac{7}{9}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

- 10 Rearrange $2(w + h) = P$ to make w the subject.

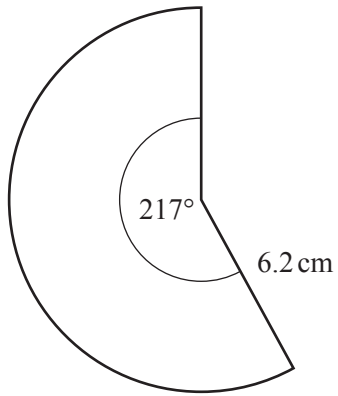
$w =$ [2]

- 11 Complete this statement with an expression in terms of m .

$$18m^3 + 9m^2 + 14m + 7 = (9m^2 + 7)(\text{.....})$$

[2]

12

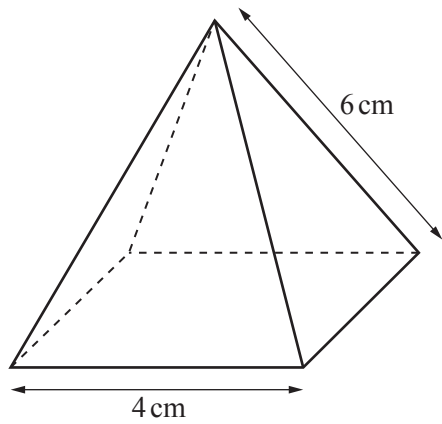
NOT TO
SCALE

The diagram shows a sector of a circle with radius 6.2 cm and sector angle 217° .

Calculate the area of this sector.

..... cm^2 [2]

13



NOT TO
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The diagram shows a pyramid with a square base.
The triangular faces are congruent isosceles triangles.

- (a) Write down the number of planes of symmetry of this pyramid.

..... [1]

- (b) **Using a ruler and compasses only**, construct an accurate drawing of one of the triangular faces of the pyramid.

[2]

- 14** One solution of the equation $ax^2 + a = 150$ is $x = 7$.

(a) Find the value of a .

$a = \dots\dots\dots$ [2]

(b) Find the other solution.

$x = \dots\dots\dots$ [1]

- 15** A is the point $(7, 12)$ and B is the point $(2, -1)$.

Find the length of AB .

$\dots\dots\dots$ [3]

- 16** $A = \frac{b \times h}{2}$

$A = 10$, correct to the nearest whole number.

$h = 4$, correct to the nearest whole number.

Work out the upper bound for the value of b .

$\dots\dots\dots$ [3]

- 17 Simplify $\frac{x^3 + 5x^2}{x^2 - 25}$, giving your answer as a single fraction.

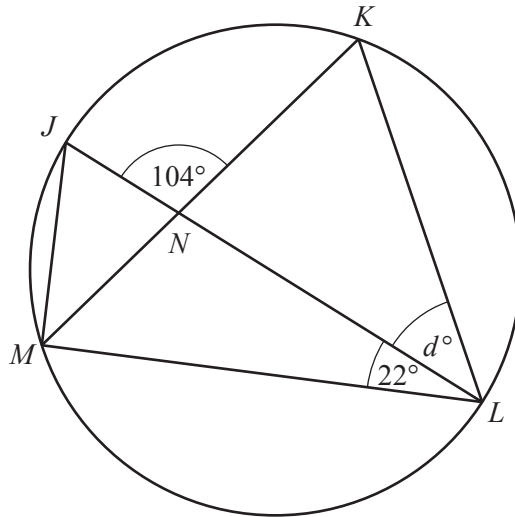
..... [3]

- 18 y is inversely proportional to the square of $(x + 1)$.
 $y = 0.875$ when $x = 1$.

Find y when $x = 4$.

$y =$ [3]

19

NOT TO
SCALE

J, K, L and M are points on the circumference of a circle with diameter JL .

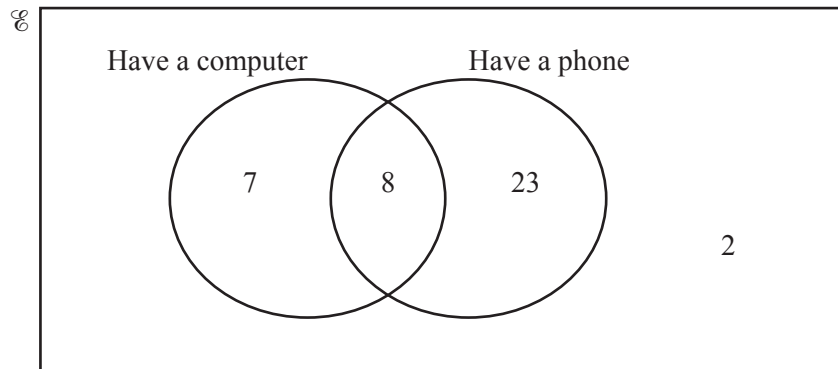
JL and KM intersect at N .

Angle $JNK = 104^\circ$ and angle $MLJ = 22^\circ$.

Work out the value of d .

$d = \dots\dots\dots$ [4]

- 20 (a) 40 children were asked if they have a computer or a phone or both.
The Venn diagram shows the results.

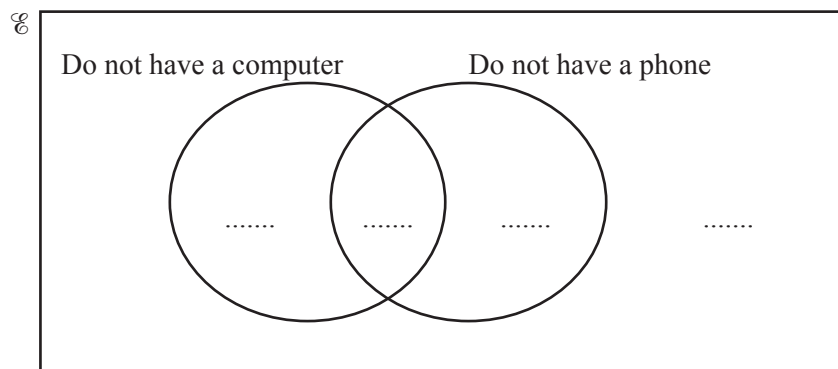


- (i) A child is chosen at random from the children who have a computer.

Write down the probability that this child also has a phone.

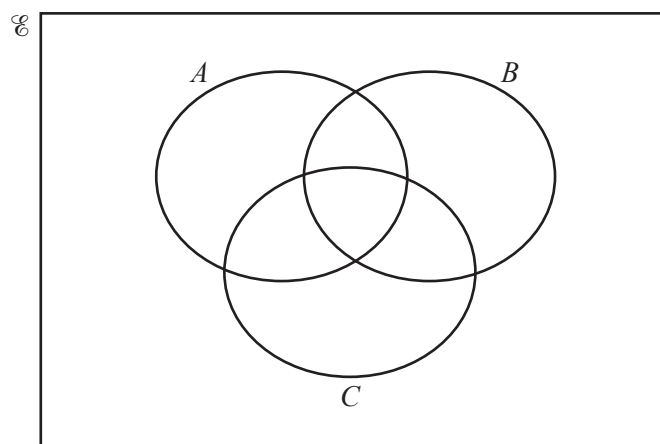
..... [1]

- (ii) Complete the Venn diagram.



[2]

- (b) In this Venn diagram, shade the region $(A \cup B') \cap C$.



[1]

21 $\mathbf{A} = \begin{pmatrix} 3 & 4 \\ 5 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & 4 \\ -3 & 2 \end{pmatrix}$

Find

(a) $5\mathbf{A}$,

$$\begin{pmatrix} & \\ & \end{pmatrix} [1]$$

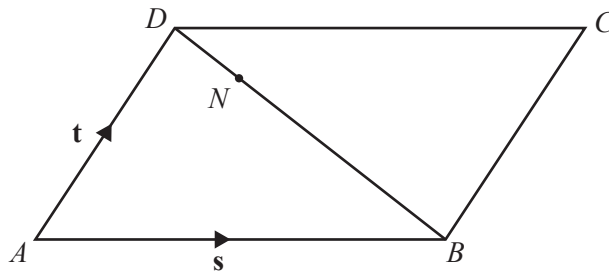
(b) $\mathbf{A} + \mathbf{B}$,

$$\begin{pmatrix} & \\ & \end{pmatrix} [1]$$

(c) $\mathbf{AB}$.

$$\begin{pmatrix} & \\ & \end{pmatrix} [2]$$

22



NOT TO
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$ABCD$ is a parallelogram.

N is the point on BD such that $BN : ND = 4 : 1$.

$\overrightarrow{AB} = \mathbf{s}$ and $\overrightarrow{AD} = \mathbf{t}$.

Find, in terms of $\mathbf{s}$ and $\mathbf{t}$, an expression in its simplest form for

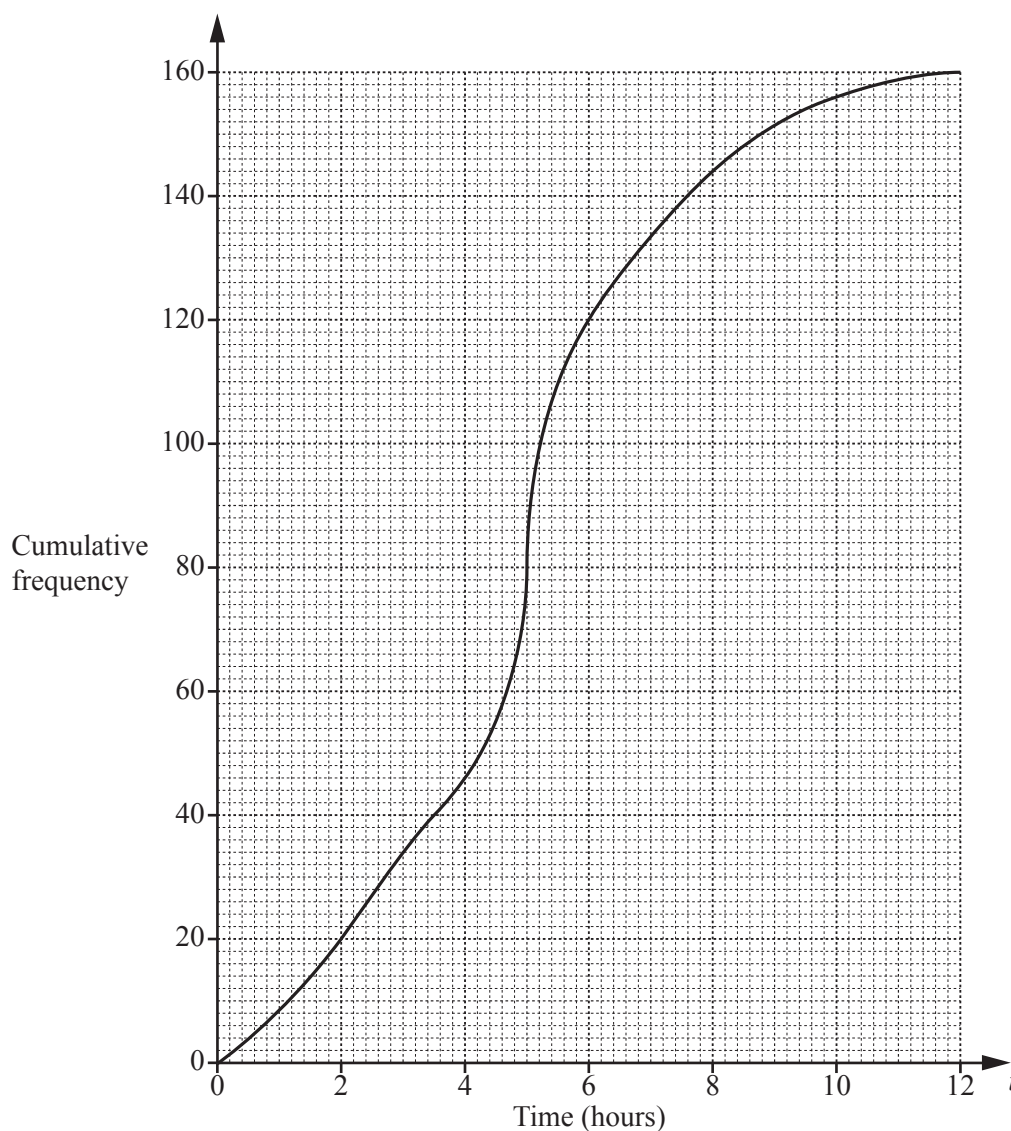
(a) $\overrightarrow{BD}$,

$$\overrightarrow{BD} = \dots\dots\dots [1]$$

(b) $\overrightarrow{CN}$.

$$\overrightarrow{CN} = \dots\dots\dots [3]$$

- 23 160 students record the amount of time, t hours, they each spend playing computer games in a week. This information is shown in the cumulative frequency diagram.



- (a) Use the diagram to find an estimate of

- (i) the median,

..... hours [1]

- (ii) the interquartile range.

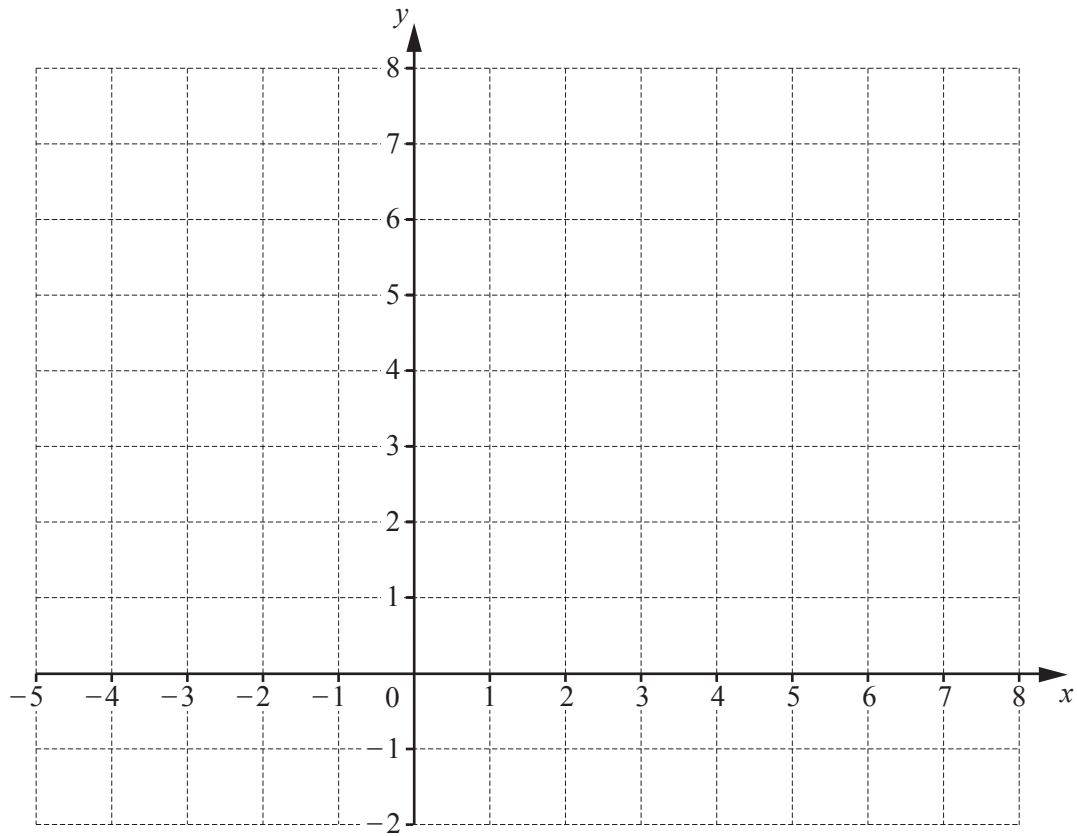
..... hours [2]

- (b) Use the diagram to complete this frequency table.

Time (t hours)	$0 < t \leq 2$	$2 < t \leq 4$	$4 < t \leq 6$	$6 < t \leq 8$	$8 < t \leq 10$	$10 < t \leq 12$
Frequency	20			24	12	4

[2]

24



By shading the **unwanted** regions of the grid, draw and label the region R which satisfies the following three inequalities.

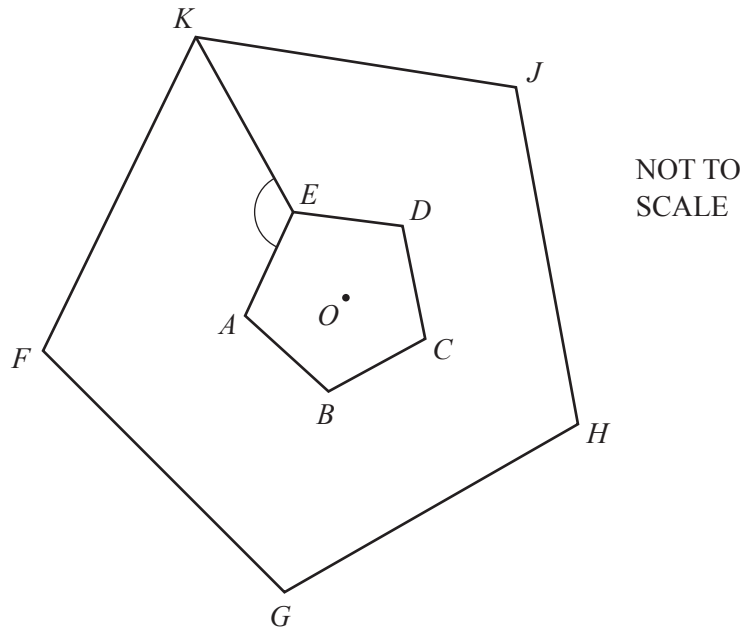
$$y \leq 2$$

$$x < 3$$

$$y \leq x + 4$$

[5]

25



The diagram shows two regular pentagons.
Pentagon $FGHIK$ is an enlargement of pentagon $ABCDE$, centre O .

- (a) Find angle AEK .

Angle $AEK = \dots\dots\dots$ [4]

- (b) The area of pentagon $FGHIK$ is 73.5 cm^2 .
The area of pentagon $ABCDE$ is 6 cm^2 .

Find the ratio perimeter of pentagon $FGHIK$: perimeter of pentagon $ABCDE$ in its simplest form.

$\dots\dots\dots$: $\dots\dots\dots$ [2]

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