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MATHEMATICS**0580/32**

Paper 3 (Core)

February/March 2024**2 hours**

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

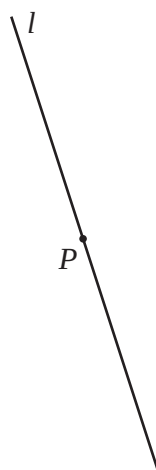
INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages.

2

1 (a)



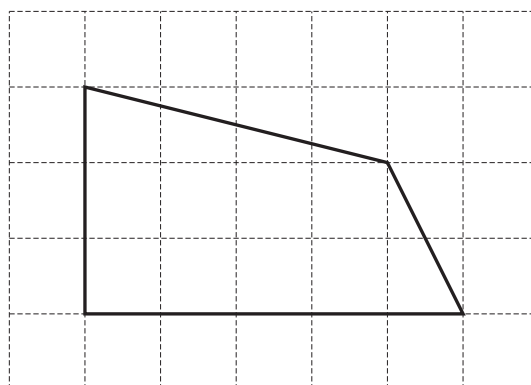
Draw a line through point P that is perpendicular to line l . [1]

(b) Write down the mathematical names for two different quadrilaterals with

- two lines of symmetry
- and
- rotational symmetry of order two.

..... and [2]

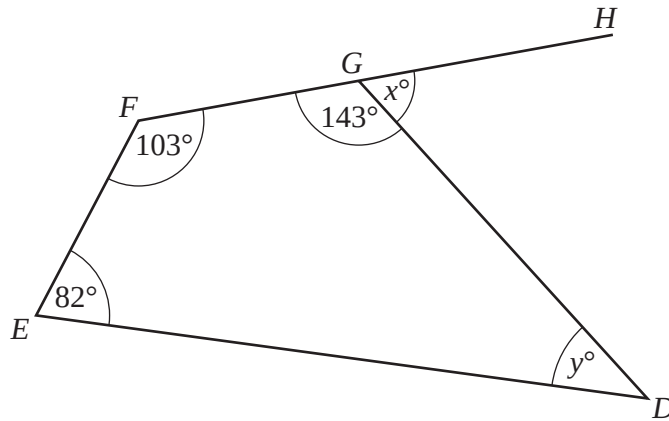
(c) The diagram shows a quadrilateral on a 1 cm^2 grid.



Find the area of this quadrilateral.

..... cm^2 [1]

(d)

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The diagram shows a quadrilateral $DEFG$ and a straight line FGH .

- (i) Angle $DEF = 82^\circ$.

Write down the mathematical name for this type of angle.

..... [1]

- (ii) Work out the value of x .
Give a geometrical reason for your answer.

$x =$ because

..... [2]

- (iii) Work out the value of y .
Give a geometrical reason for your answer.

$y =$ because

..... [2]

2 (a)

Fuel Garage A \$1.41 per litre

Fuel Garage B \$1.50 per litre

- (i) Tiya buys 55 litres of fuel from garage A.

Work out the change she receives from \$100.

\$ [2]

- (ii) Work out how much cheaper it is to buy 20 litres of fuel from garage A than from garage B.

\$ [2]

- (iii) These are the amounts that 6 people spend on fuel at garage A.

\$63 \$84.50 \$72.23 \$46 \$54.10 \$80

Calculate the mean **number of litres** that they buy.

..... litres [3]

- (iv) The cost of fuel at garage B increases from \$1.50 to \$1.53 .

Calculate the percentage increase.

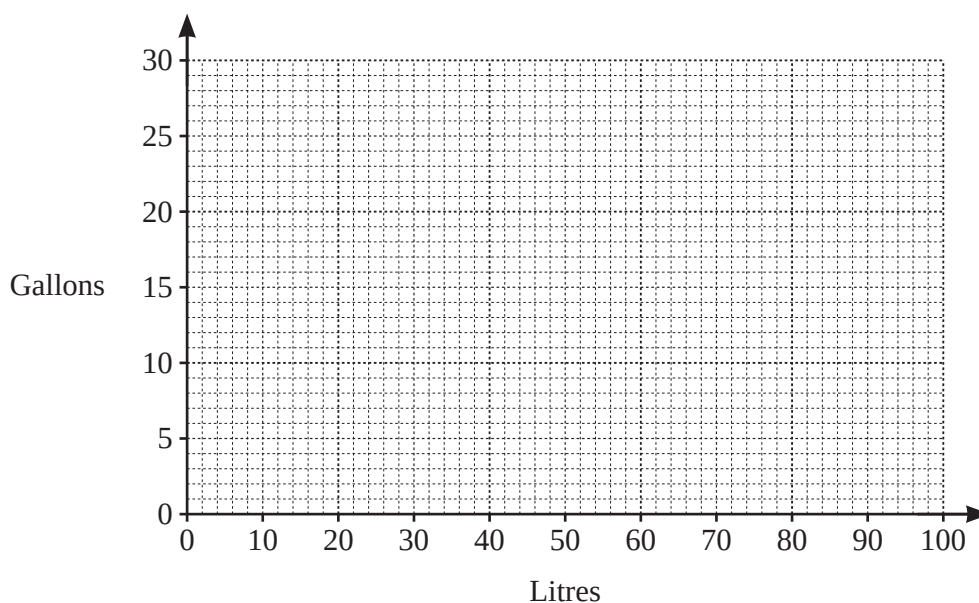
..... % [2]

- (b) The fuel tank of a car is $\frac{2}{5}$ full.
It takes 39 more litres of fuel to fill the tank.

Work out the number of litres of fuel in a full tank.

..... litres [3]

- (c) (i) Use 1 litre = 0.22 gallons to complete this conversion graph.



[2]

- (ii) Use 1 litre = 0.22 gallons to complete this statement.

1 gallon = litres. [1]

- (d) A cylindrical tank for storing fuel has radius 1.5 metres and height 8 metres.

Calculate the volume of the tank **in litres**.

..... litres [3]

- 3 (a) In triangle DEF , $DE = 6\text{ cm}$ and $DF = 4.8\text{ cm}$.

Using a ruler and compasses only, construct triangle DEF .

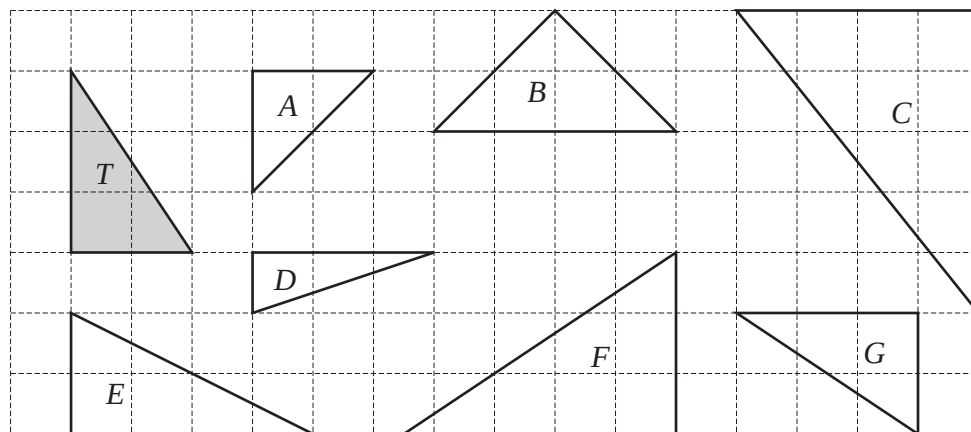
Leave in your construction arcs.

The line EF has been drawn for you.



[2]

(b)



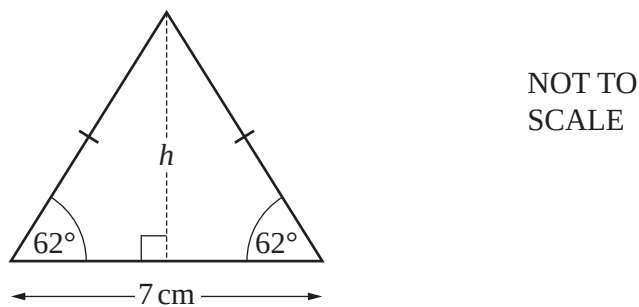
- (i) Write down the letter of the triangle that is congruent to triangle T .

..... [1]

- (ii) Write down the letter of the triangle that is similar but not congruent to triangle T .

..... [1]

(c)



The diagram shows an isosceles triangle.

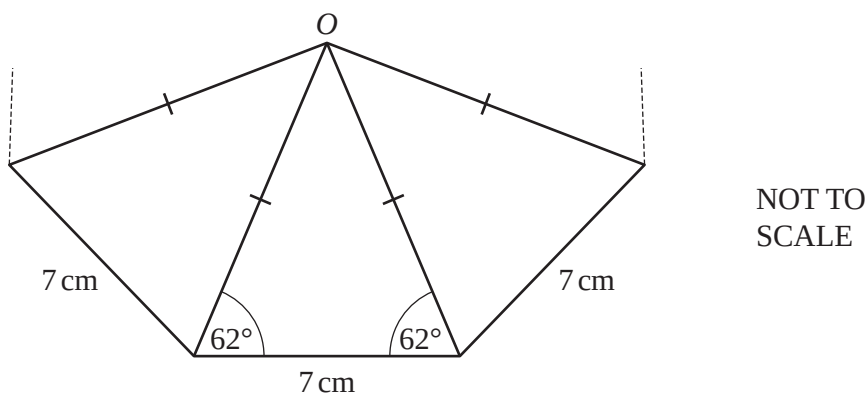
- (i) Show that the perpendicular height, h , is 6.58 cm, correct to 3 significant figures.

[3]

- (ii) Calculate the area of the triangle.
Give the units of your answer.

..... [3]

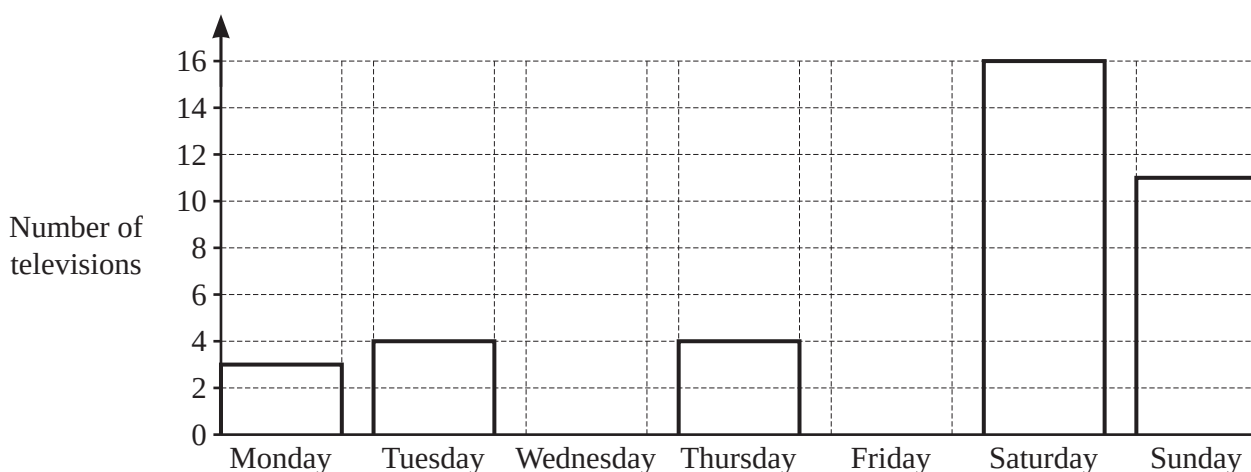
- (iii) Kalpit tries to arrange some of these triangles to make a regular polygon with centre O .



Show that Kalpit cannot make a regular polygon.

[3]

- 4 (a) A shop sells 58 televisions in one week.
The bar chart shows the number of televisions that the shop sells on five of the days.



- (i) Write down the number of televisions that the shop sells on Monday.

..... [1]

- (ii) Find the fraction of the televisions that the shop sells on Sunday.

..... [1]

- (iii) The number of televisions that the shop sells on the other two days is in the ratio

$$\text{Wednesday} : \text{Friday} = 2 : 3.$$

Complete the bar chart.

[4]

- (iv) Write down the mode.

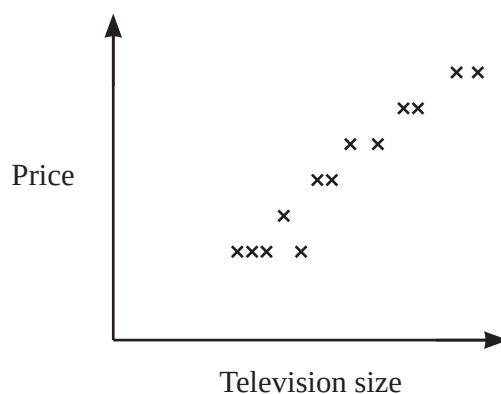
..... [1]

- (b) A television has a price of \$550.
This price is reduced by 4%.

Calculate the new price of this television.

\$ [2]

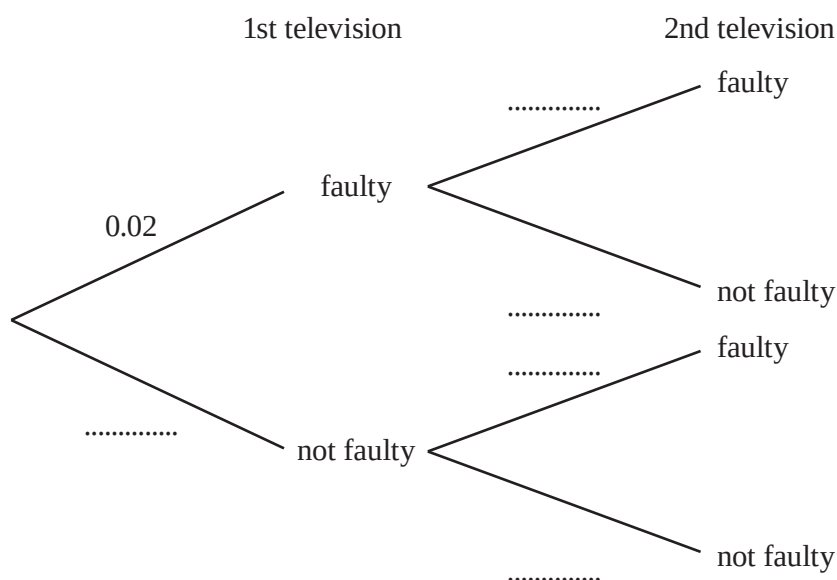
- (c) The scatter diagram shows the prices of different sized televisions.



Write down the type of correlation shown in the scatter diagram.

..... [1]

- (d) Hemang buys two televisions.
The probability that a television is faulty is 0.02 .



- (i) Complete the tree diagram. [2]

- (ii) Find the probability that Hemang buys two faulty televisions.

..... [2]

- (iii) The shop sells 4150 televisions in one year.

Calculate the expected number of faulty televisions.

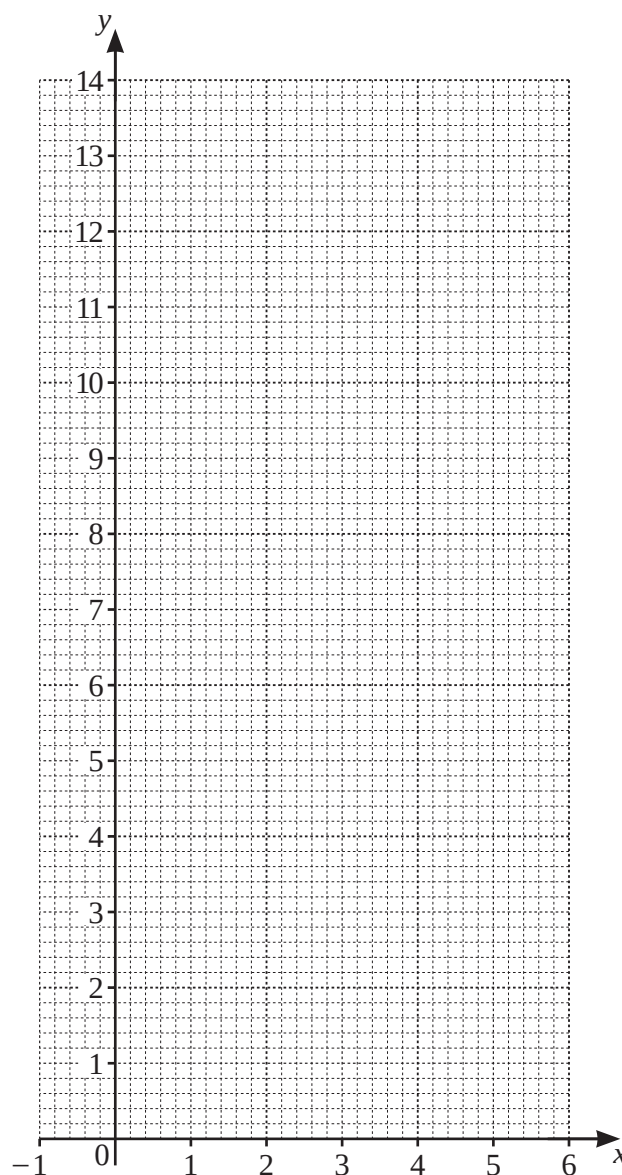
..... [1]

- 5 (a) (i) Complete the table of values for $y = -x^2 + 5x + 7$.

x	-1	0	1	2	3	4	5	6
y			11			11		1

[3]

- (ii) On the grid, draw the graph of $y = -x^2 + 5x + 7$ for $-1 \leq x \leq 6$.



[4]

- (iii) (a) Write down the equation of the line of symmetry of the graph.

..... [1]

- (b) The points $(-8, -97)$ and $(t, -97)$ also lie on the graph of $y = -x^2 + 5x + 7$.

Use symmetry to find the value of t .

$t =$ [1]

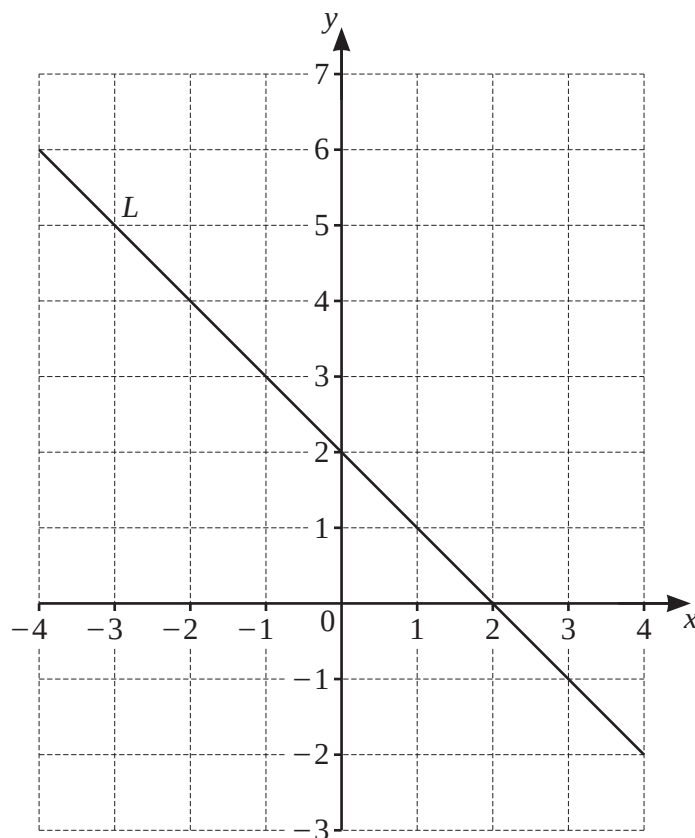
(b) Write down the gradient of the line $y = 9x - 4$.

..... [1]

(c) Write down the equation of a line parallel to $y = -5x + 19$.

$y =$ [1]

(d)



Find the equation of line L in the form $y = mx + c$.

$y =$ [2]

(e) Make x the subject of the formula $y = mx + c$.

$x =$ [2]

- 6 (a) Town S is 44 km from town R on a bearing of 117° .

- (i) Using a scale of 1 cm represents 8 km, mark the position of town S .



Scale: 1 cm to 8 km

[2]

- (ii) Anvi cycles the 44 km from R to S .
She leaves R at 13 15 and cycles at a speed of 12 km/h.

Work out the time she arrives at S .

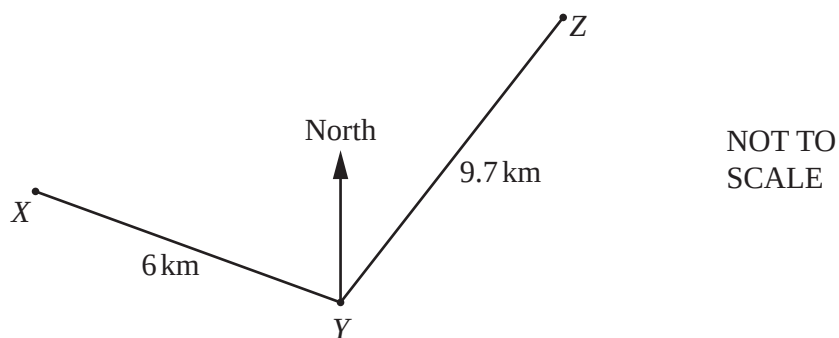
..... [3]

- (b) A tower has a height of 16 metres.
When Jai makes a scale drawing of the tower it has a height of 20 cm.

Work out the scale Jai uses, giving your answer in the form $1 : n$.

1 : [2]

(c) X , Y and Z are three towns.



X is on a bearing of 288° from Y .
 Z is on a bearing of 018° from Y .

(i) Show that angle XYZ is 90° .

[2]

(ii) $XY = 6$ km and $YZ = 9.7$ km.

Calculate XZ .

$XZ = \dots\dots\dots$ km [2]

7 (a) $P = 3a + 5$

Find the value of P when $a = 2$.

$$P = \dots\dots\dots [1]$$

(b) Solve these equations.

(i) $7x = -42$

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

(ii) $9(8x - 7) = 72$

$$x = \dots\dots\dots [3]$$

(c) $5^8 \times 5^k = 5^{-24}$

Find the value of k .

$$k = \dots\dots\dots [1]$$

(d) Solve the simultaneous equations.

$$-6x - y = 13$$

$$8x + y = -51$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [2]$$

15

- (e) n is an integer where $n > -3$ and $n \leq 1$.

Write down all the possible values of n .

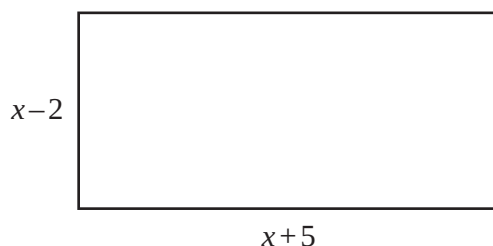
..... [2]

- (f) A boy walks for 35 minutes at x metres per minute.
He then runs for t minutes at 160 metres per minute.

Write down an expression, in terms of x and t , for the total distance, in metres, the boy travels.

..... m [2]

- (g)



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Find an expression for the area of this rectangle.
Give your answer in the form $x^2 + ax + b$.

..... [3]

Question 8 is printed on the next page.

- 8 (a) 120 people teach in a university mathematics department.
Some information is shown in the table.

	Lecturers	Professors	Total
Part-time		11	
Full-time			
Total			120

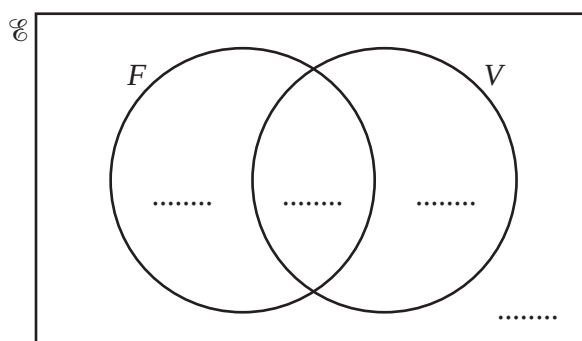
One fifth of the people are professors.
30% of the people are part-time.

Work out the number of full-time lecturers.

..... [4]

- (b) $\mathcal{C} = \{\text{children in a school}\}$
 $F = \{\text{children who like fruit}\}$
 $V = \{\text{children who like vegetables}\}$

24 children like vegetables but do not like fruit.
 8 children do not like fruit and do not like vegetables.
 $n(F \cap V) = 9$
 $n(F) = 3 \times n(V)$



- (i) Complete the Venn diagram. [3]

- (ii) Work out $n(F \cup V)$.

..... [1]

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