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1 Evaluate.

(a) $0.71 - 1.2$

..... [1]

(b) $2\frac{4}{7} \div \frac{9}{14}$

..... [2]

2 Work out.

$$\left(\frac{1 \times 10^2}{9}\right)^{-\frac{3}{2}}$$

..... [2]

3 By writing each number correct to 1 significant figure, estimate.

$$2.511 \times \sqrt{8.71} + 7.822$$

..... [2]

4 $\mathbf{X} = \begin{pmatrix} 4 & -3 \end{pmatrix}$ $\mathbf{Y} = \begin{pmatrix} 1 & -1 \\ 4 & -4 \end{pmatrix}$

- (a) Predict the order of matrix $\mathbf{XY}$.

..... [1]

- (b) Explain why the inverse of $\mathbf{Y}$ does not exist.

.....

.....[1]

- 5 (a) Write 300 200 015 in words.

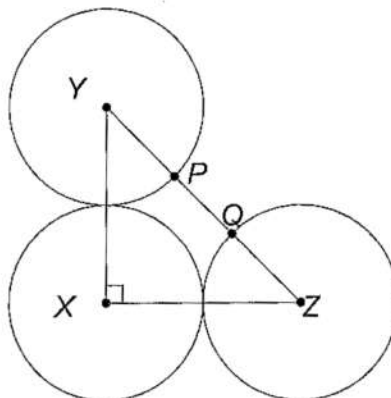
.....

.....[1]

- (b) Given that 300 200 015 can be written in the form $3 \times 10^8 + b + 15$,
express the value of b in standard form.

..... [1]

- 6 The diagram shows three identical circles of radius 1 unit.
 X , Y and Z are centres.
 The points P and Q lie on the circumference of the two circles.
 XY is perpendicular to XZ .



Find the value of b when the distance PQ is $\sqrt{8} - b$.

$b = \dots\dots\dots$ [3]

- 7 Given that $a > 1$ and it is an integer, arrange the following in order of size, starting with the smallest.

$$a, \quad a^{-a}, \quad a^0, \quad a^{\frac{1}{a}}$$

$\dots\dots\dots$ [2]

8 Factorise completely.

(a) $2t + t^3$

..... [1]

(b) $x + t - 1 - tx$

..... [2]

9 Simplify.

$$\frac{7 - 7m}{m^2 - 3m + 2}$$

..... [3]

- 10 The number of sugar grains in a 2 kg packet is 0.5 billion.
Write, in standard form,

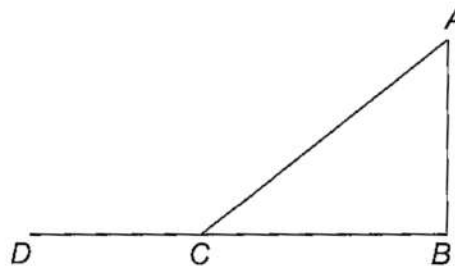
(a) the number of sugar grains in the packet,

..... [1]

(b) the mass of each sugar grain in grams.

.....g [2]

- 11 The diagram shows right-angled triangle ABC and a straight-line BCD .
 $\tan \widehat{DCA} = -\frac{5}{12}$.



Find the value of $2 \sin \widehat{CAB}$.

..... [3]

- 12 y varies directly as $(x^2 + 1)$.
The corresponding values of x and y are shown in the table.

x	2	3
y	15	a

Find

- (a) the constant of variation,

..... [2]

- (b) the value of a .

..... [2]

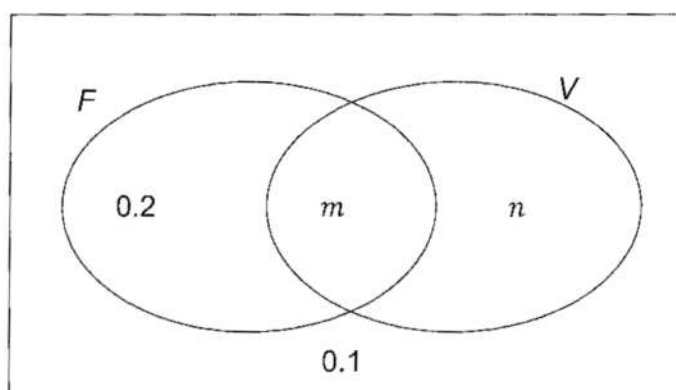
- 13 In a class of 40 students, the probabilities that a student will take part in football and in volleyball are recorded.

The probability that a student takes part in

- only football (F) is 0.2
- neither volleyball (V) nor football is 0.1

The number of students who will take part in volleyball only is 18.

Some probabilities are shown in the Venn diagram.



Determine

- (a) the probability, n , that a student will take part in volleyball only,

.....[1]

- (b) the number of students that will take part in both football and volleyball.

..... [2]

14 (a) $(3x - y)^2 - (x - 5)^2 = 0$.

If $2x - y + 5 = 0$ satisfies the above equation,

show that $4x - y - 5 = 0$ also satisfies the equation $(3x - y)^2 - (x - 5)^2 = 0$.

[2]

(b) Hence, determine the value of x .

$x = \dots\dots\dots$ [2]

15 The table shows the number of people in different age groups in a bus.

age (x years)	$15 < x \leq 25$	$25 < x \leq 30$	$30 < x \leq 50$
number of people	28	40	12

(a) A histogram is drawn and the height of the bar for the group $15 < x \leq 25$ is 7 units.

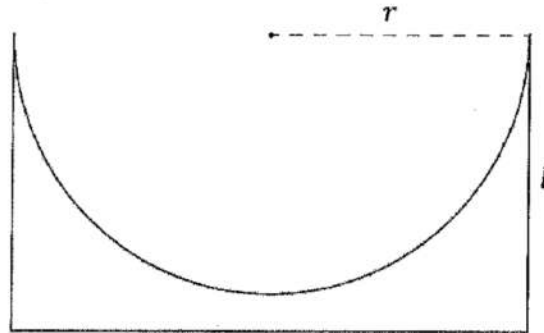
Calculate the height of other bars.

$\dots\dots\dots$ [2]

(b) Calculate an estimate of the number of people whose age is under 28 years.

$\dots\dots\dots$ [2]

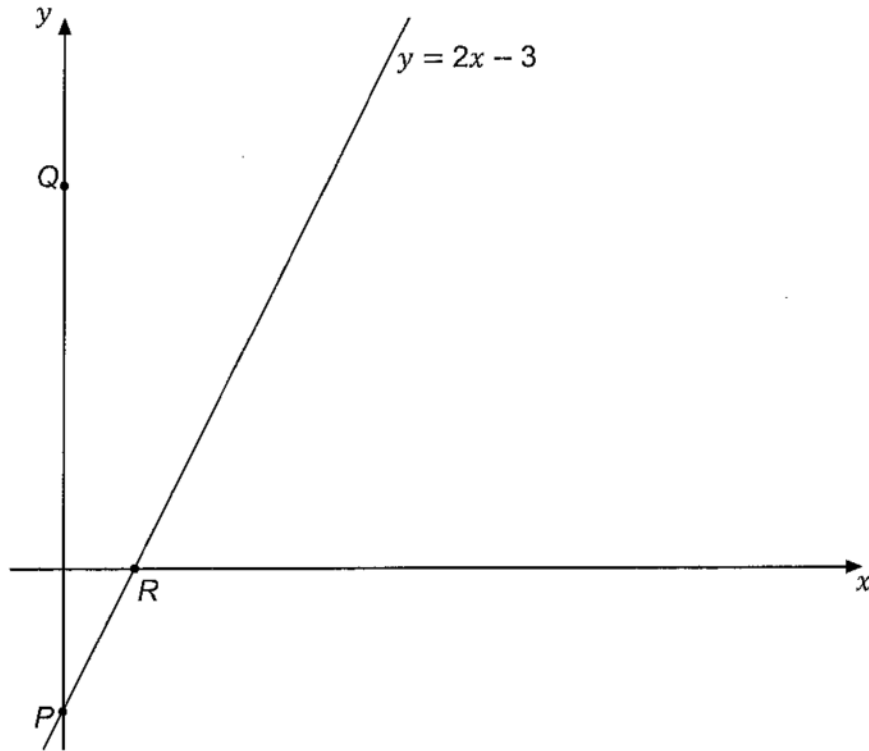
- 16 The diagram shows a rectangle of width l and semi-circle of radius r . The perimeter of the figure is 8 cm.



Show, in terms of r , that the width, $l = 4 - r - \frac{\pi r}{2}$.

[3]

- 17 The graph shows line $y = 2x - 3$ which intersects the axes at P and R .
The point Q lies on the y -axis such that the length of the line segment, PQ , is 11 units.



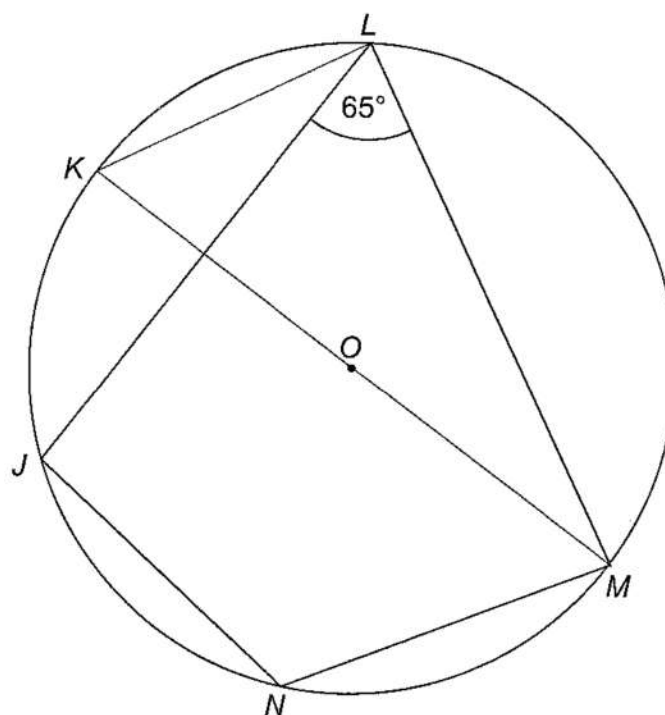
- (a) Write the equation of the line which passes through Q and is parallel to the line $y = 2x - 3$.

..... [2]

- (b) Find the coordinates of the midpoint of the line QR .

..... [2]

- 18 The diagram shows a circle with diameter KM , centre O .
Angle $JLM = 65^\circ$.



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Find

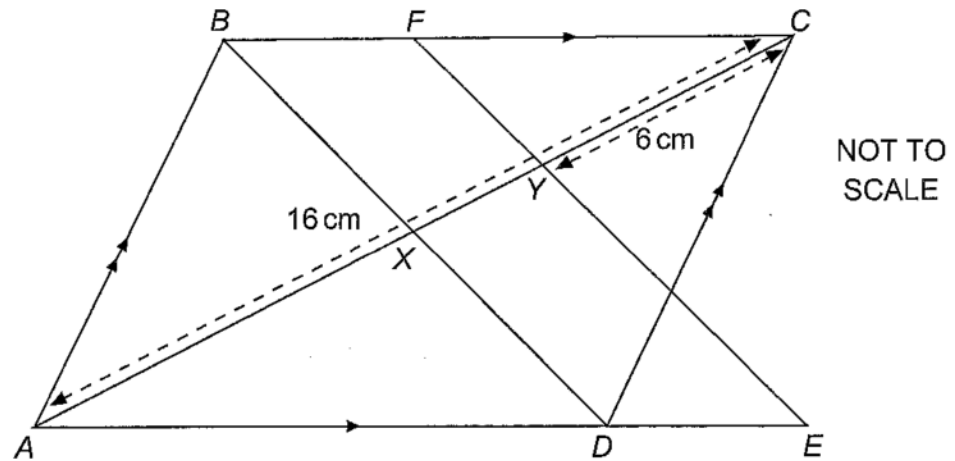
- (a) the size of angle JNM ,

..... $^\circ$ [1]

- (b) the size of angle KLJ .

..... $^\circ$ [1]

- 19 The diagram shows parallelogram $ABCD$.
 The diagonals AC and BD intersect at X .
 ADE and FYE are straight lines.
 $AC = 16\text{ cm}$ and $YC = 6\text{ cm}$.



- (a) State the length of AX .

..... cm [1]

- (b) Find the ratio of $AX : XY$.

..... : [1]

- (c) $\triangle ABX$ is similar to $\triangle CFY$.
 The area of triangle ABX is 32 cm^2 .

Find the area of $\triangle CFY$.

..... cm^2 [2]

20 $f(x) = 3x + 2$

Find $g(x)$ when $fg(x) = 3x - 13$.

$g(x) = \dots\dots\dots$ [3]

21 Solve the inequality.

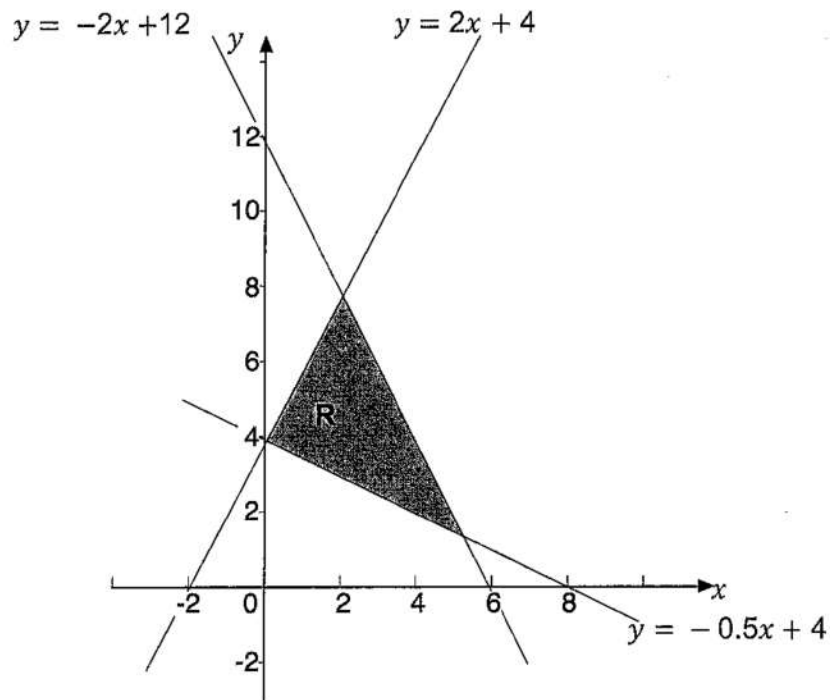
$$\frac{x - 5}{-2} \geq 2$$

$\dots\dots\dots$ [2]

- 22 Given $\frac{x+2}{m} + \frac{3x+3}{k} = \frac{15x+24}{18}$,
find the value of k .
Show your working clearly.

$k = \dots\dots\dots$ [3]

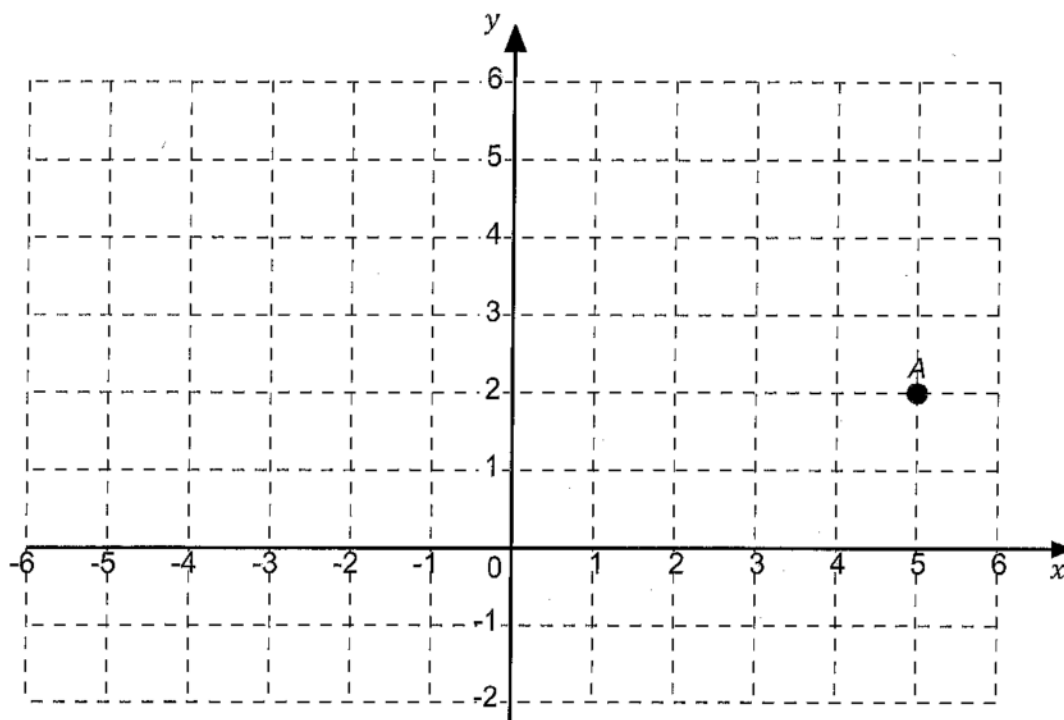
- 23 The diagram shows the shaded region **R** enclosed by three lines.



Write the three inequalities which satisfy the region **R**.

.....
.....
..... [3]

- 24 The grid shows the point $A(5,2)$.
The point is transformed twice.
First by using a translation vector $\begin{pmatrix} -3 \\ 3 \end{pmatrix}$ followed by rotation, anticlockwise 90° , centre origin.



Describe fully a single transformation that maps A onto its image.

.....
.....[3]