THE ENGLISH SCHOOL

MID PROGRAM ENTRY INTO YEAR 4

MATHEMATICS **SATURDAY 4th June 2022**

Time allowed: 2 hours

Instructions to candidates
Answer all the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates
This paper has 29 questions.
There are 21 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 120.
The marks for each question is shown in round brackets, e.g. **(2)**
Calculator may be used.

Advice for candidates
Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper
Calculator, ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks:
……%

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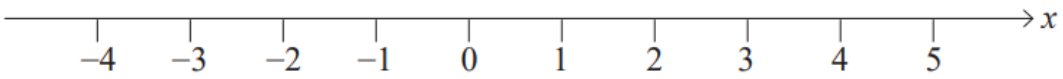
1. (a) Solve $3-4x \leq 11$

…..

(2)

(b) Show your answer on the number line below.



(1)

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2. Josh, Shivani, Abdul and Lauren are due to split some commission in the ratio 3 : *k* : 4 : 7, where *k* is a constant.
Abdul receives £200 more commission than Shivani.
Lauren receives £700 in commission.
Find the total amount of commission given to Josh, Shivani, Abdul and Lauren.
You must show all of your working.

£…..

(3)

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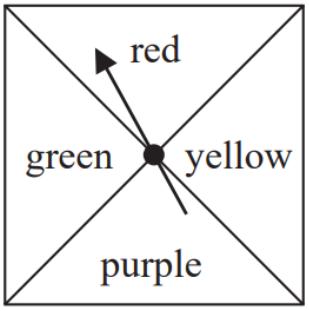
3. Here is a biased spinner



When the spinner is spun once, the probabilities that it lands on red or on yellow or on green are given in the table.

Colour	red	yellow	purple	green
Probability	0.25	0.2		0.2

(a) Work out the probability that the spinner lands on red or on yellow.

…….....

(1)

Yang is going to spin the spinner 300 times.
(b) Work out an estimate for the number of times the spinner will land on purple.

…….....

(2)

4. When a number is reduced by 15%, the answer is 6154.
What is the original number?

…….....

(2)

Leave blank

5. (a) Simplify

(i) $\dfrac{5+15x}{1+3x}$

.....

(2)

(ii) $6-2y-4(2-5x)+2(2-5y)$

.....

(2)

(b) Expand and simplify $(1-4x)(1+4x)(x+3)$

.....

(2)

6. (a) Factorise $x^2-11x+10$

.....

(2)

(b) Hence solve $x^2-11x+10=0$

.....

(1)

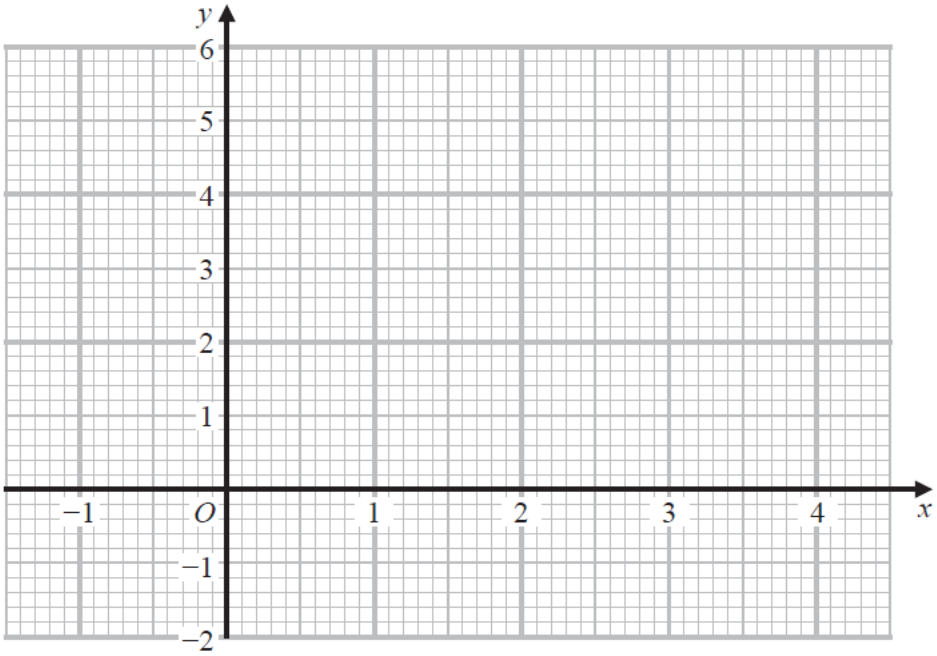
Leave blank

7. (a) Complete the table of values for $y = x^2 - 3x + 1$

x	−1	0	1	2	3	4
y		1	−1			

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$ for values of x from −1 to 4



(1)

(c) Using your graph, find estimates for the solutions of the equation $x^2 - 3x + 1 = 0$

.....

(2)

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8. $P = 3^3 \times 5^2 \times 7$

$Q = 3^2 \times 5 \times 7^2$

(a) Write down the highest common factor (HCF) of P and Q

.....

(2)

(b) Find the smallest whole number that Q can be multiplied by to give a square number.

.....

(1)

Leave blank

9. (a) If the number 5.1×10^{-13} is written out in full, how many zeros would there be between the decimal point and the first significant figure?

.....

(1)

(b) One of the numbers below has the same value as 3.6×10^{2}.
Write down the number.

36^{3} 36^{4} $(3.6\times10)^{4}$ 0.36×10^{3} 0.36×10^{5}

.....

(1)

(c) Without using a calculator determine the value of $\left(2.5\times10^{-2}\right)^{2}$
giving your answer in both normal and standard form:

…….. …….

(3)

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10. Across 25 football matches, a football team has a mean score of 2.80 goals per match.

The team have one more match left in the tournament.
They want to raise their mean number of goals per match to 3.00 for this tournament.
How many goals does the football team need to score in their final match to achieve this?

..... goals

(3)

Leave blank

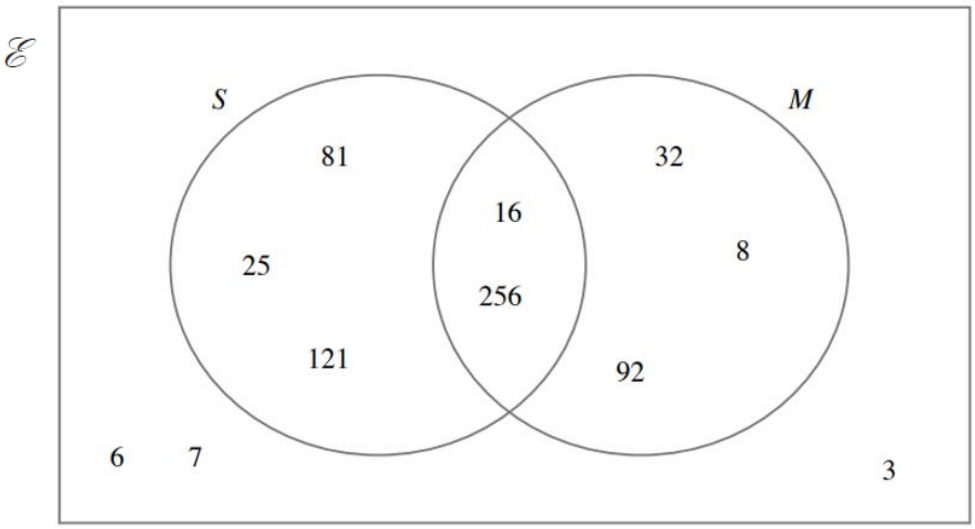
11. George generates some numbers at random.

He separates them into two categories:

- square numbers (S)
- multiples of 4 (M)

He draws a Venn diagram for his set of numbers.

His Venn diagram is shown below.



(a) List

(i) M

.....

(1)

(ii) $(S \cup M)'$

.....

(1)

(b) Find $n(S \cap M)$

.....

(1)

Leave blank

12. Solve the following equations.

(a) $6+2(x-2)=8-(2-10x)$

x = ...

(3)

(b) $\dfrac{3x}{2x+9}=\dfrac{1}{2}$

x = ...

(2)

(c) $\dfrac{3}{2}+\sqrt{x-1}=5$

x = ...

(3)

(d) $(x+3)^2-2=34$

.....

(4)

Leave blank

13. The acceleration (a) after time (t) can be calculated with the formula:

$$a = \frac{v - u}{t}$$

where v is the speed and u is the initial speed.

If

$v = 23.3$ correct to 3 significant figures,
$u = 18$ and $t = 39$, both measured to the nearest whole number,

calculate the minimum possible value for a, giving your answer to 2 significant figures.

.....

(3)

14. Simplify the following expressions:

(a) $\frac{3x-4}{6} - \frac{2x-3}{12}$

.....

(3)

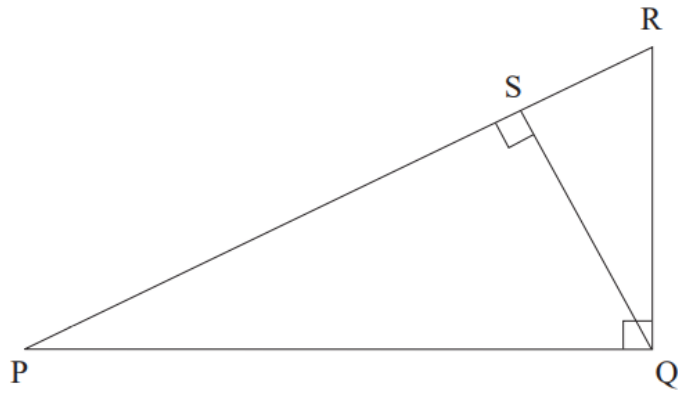
(b) $\frac{(2fg)^3}{kx^2} \div \frac{4f^2g^3}{k^2x^2}$

.....

(3)

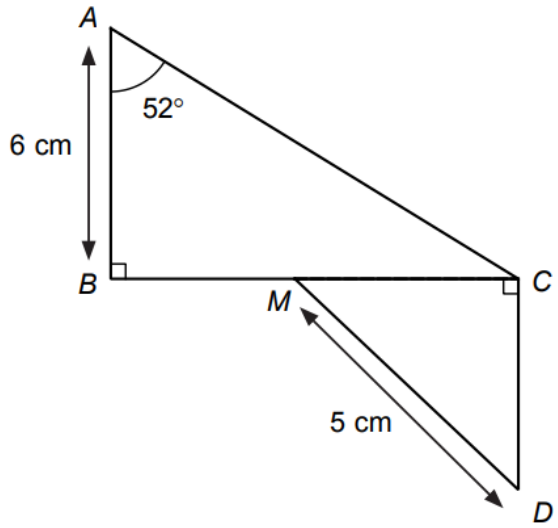
Leave blank

15. *PQR* is a right-angled triangle and *QS* is the perpendicular line from *Q* to *PR*.
Prove that the triangles *PQR* and *QSR* are similar.



(3)

16. Two right-angled triangles, *ABC* and *MCD*, are shown in the diagram below.



Not drawn accurately

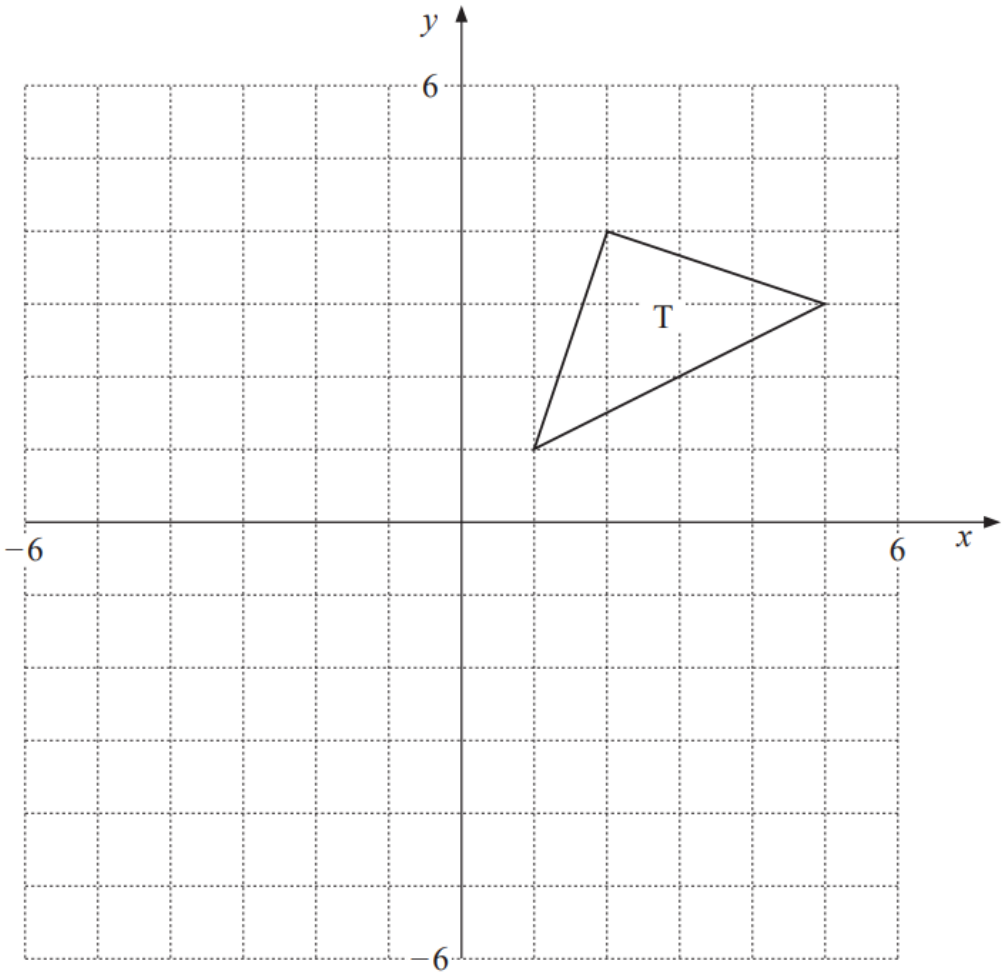
The point *M* is the midpoint of *BC*. Find the length of the side *CD*.
Give your answer correct to 3 significant figures.

…..... cm

(4)

17.

Leave blank



(a) Draw the image of the triangle, T, after a translation of 4 units to the left and 5 units down.
Label the image P.

(2)

(b) Draw the image of the triangle, T, after a rotation of 90° anti-clockwise about the origin.
Label the image Q.

(2)

Leave blank

18. In the space below, construct an equilateral triangle of side length 5 cm.
You must show all of your construction lines.

(2)

19. Re-arrange the formula to make r the subject.

$$V = \frac{4}{3}\pi r^3$$

…….....

(2)

Leave blank

20. John earns £x per hour on Fridays and £y per hour on Saturdays.
In March he worked 20 hours on Fridays, 12 hours on Saturdays and earned £322
In April he worked 16 hours on Fridays, 10 hours on Saturdays and earned £262
Use simultaneous equations to find the values of x and y

x = ...

y = ...

(5)

Leave blank

21. The table shows some information about the profit made each day at a cricket club on 100 days.

Profit (£x)	**Frequency**
$0 \leq x < 50$	10
$50 \leq x < 100$	15
$100 \leq x < 150$	25
$150 \leq x < 200$	30
$200 \leq x < 250$	5
$250 \leq x < 300$	15

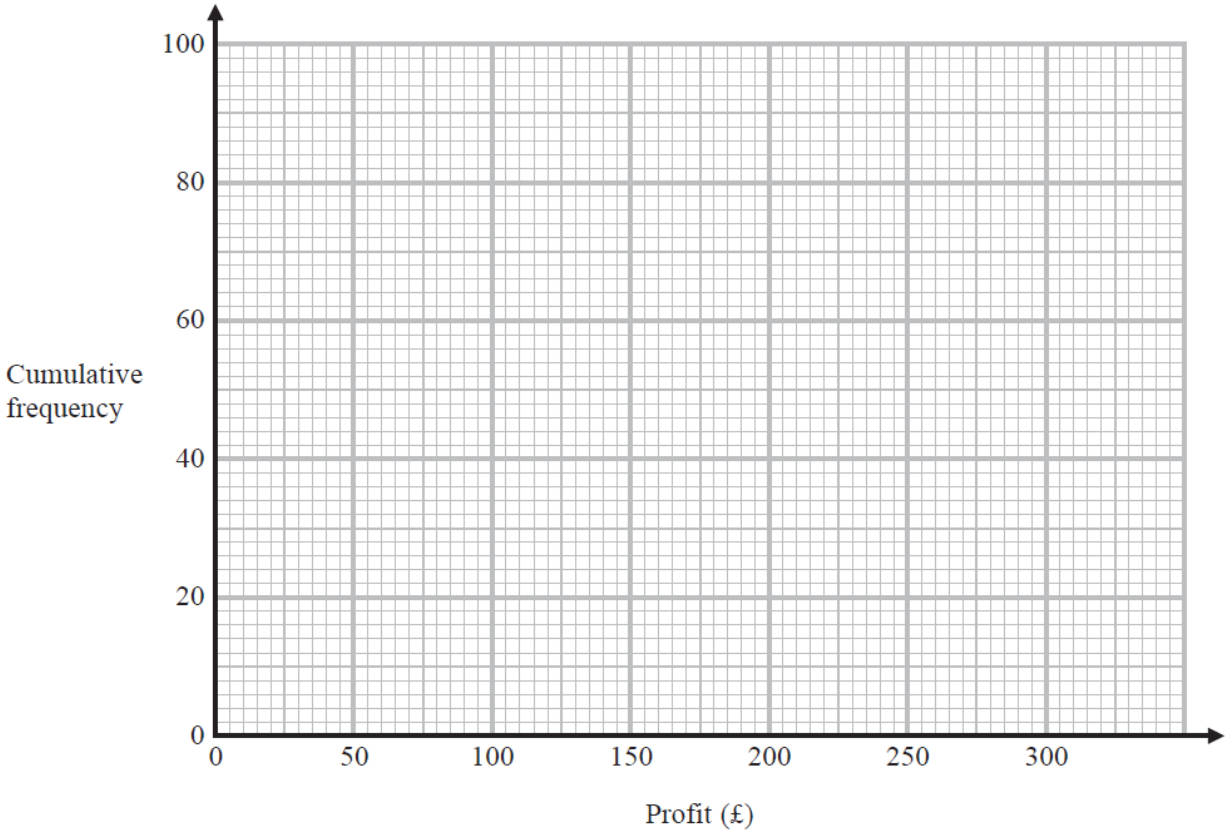
(a) Complete the cumulative frequency table.

Profit (£x)	**Cumulative frequency**
$0 \leq x < 50$	
$0 \leq x < 100$	
$0 \leq x < 150$	
$0 \leq x < 200$	
$0 \leq x < 250$	
$0 \leq x < 300$	

(1)

Leave blank

(b) On the grid, draw a cumulative frequency graph for this information.



(1)

(c) Use your graph to find an estimate for the number of days on which the profit was less than £125

..... days

(1)

(d) Use your graph to find an estimate for the interquartile range.

£.....

(3)

Leave blank

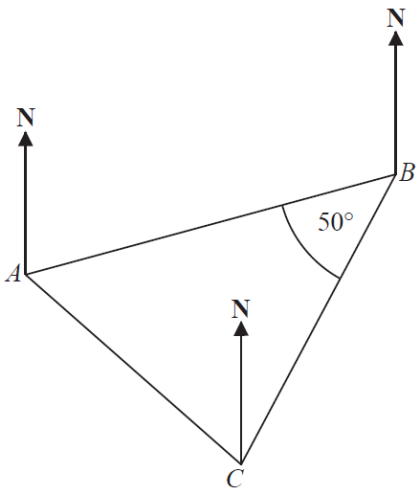
22. Find the median and range of the first ten prime numbers.

median = ...

range = ...

(3)

23. The diagram shows the positions of three points, *A*, *B* and *C*, on a map.



The bearing of *B* from *A* is 070°

Angle *ABC* is 50°
AB = *CB*

Work out the bearing of *C* from *A*.

..... °

(3)

Leave blank

24. Factorise the following expressions:

(a) $\frac{1}{6}\pi r^2 + \frac{5}{6}\pi r^4 k$

.....

(2)

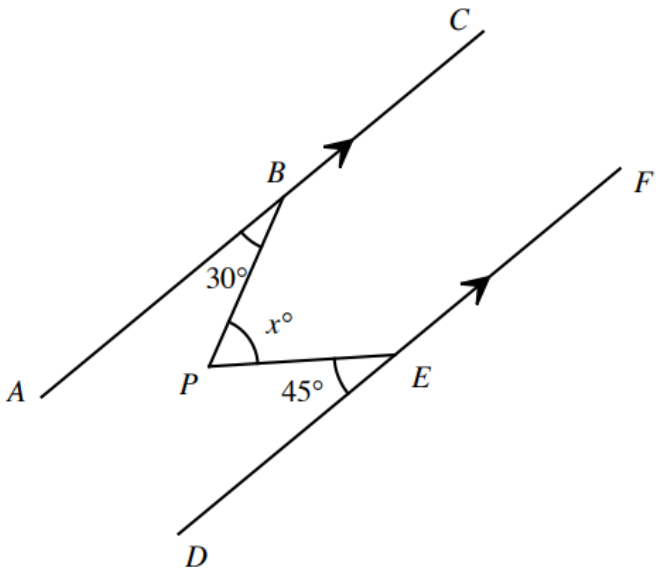
(b) $81p^2 - 1$

.....

(2)

25. The lines *ABC* and *DEF* are parallel lines.
The angle *PBA* is 30°
the angle *PED* is 45°
and the angle *BPE* is x°

Find the value of x .
You must show all of your working.



NOT TO SCALE

x = ... °

(3)

Leave blank

26. The diagram shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

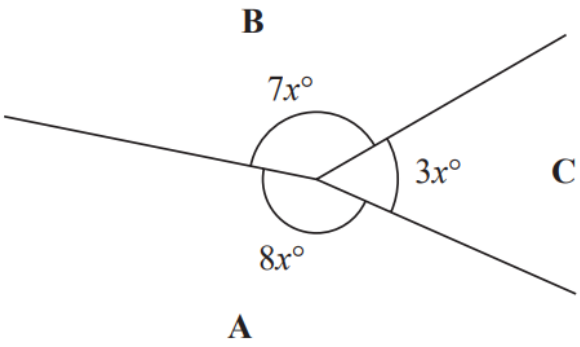


Diagram **NOT** accurately drawn

Polygon **B** has n sides.
Work out the value of n.

n = ...

(4)

Leave blank

27. Line A has equation $y = 4 - 3x$

Line B has equation $6x + 2y = 7$

(a) Show that line A and line B are parallel.

(2)

(b) The line C has the equation $7x - y = k(4 - x)$

(i) Find an expression in terms of k for the gradient of line C.

.....

(2)

(ii) Given that line C is parallel to line A, find the value of k.

k = ...

(2)

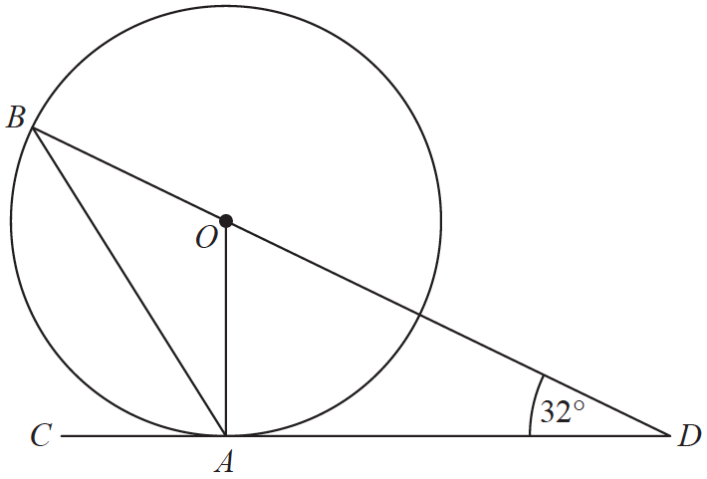
(c) Find the y intercept of the line C.

.....

(2)

28.

Leave blank



A and *B* are points on a circle with centre *O*.

CAD is the tangent to the circle at *A*.

BOD is a straight line.

Angle *ODA* = 32°

Work out the size of angle *ABO*.

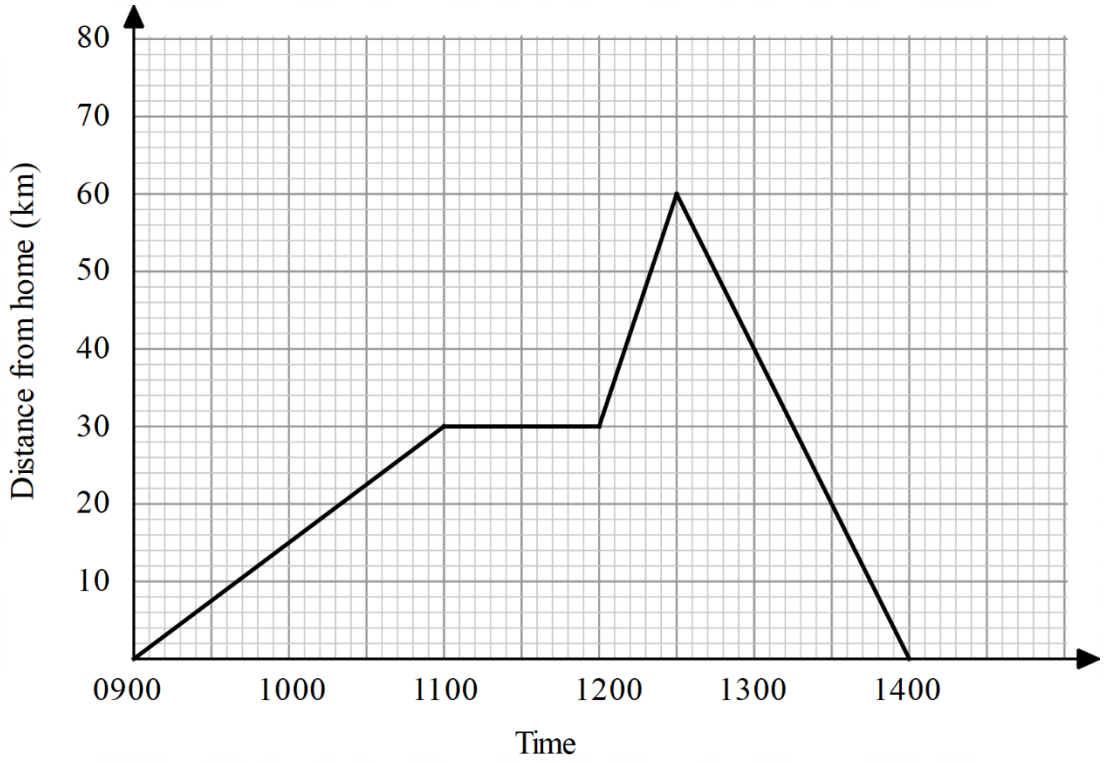
You must give reasons for each stage of your working.

..... °

(5)

Leave blank

29. The distance-time graph below shows Sally's journey on a particular day.
Sally left home at 09:00 for a road trip. She stopped at the coffee shop for an iced coffee.
Then she continued her journey until she reached her destination at 12:30.
She briefly took some photos of the scenery and drove back home at a steady speed.



(a) Find her distance from home at 13:30.

…..... km
(1)

(b) Calculate Sally's average speed (excluding stops).

…..... km/h
(3)

TOTAL FOR PAPER IS 120 MARKS

END OF PAPER