

Dr Oliver Mathematics
GCSE Mathematics
2010 June Paper 3H: Non-Calculator
1 hour 45 minutes

The total number of marks available is 100.

You must write down all the stages in your working.

1. Simplify $6x + 9y + 2x - 3y$. (2)
2. Here are the weights, in grams, of 16 eggs. (3)

47 45 50 53 43 61 53 62
58 56 57 47 55 62 58 58

Draw an ordered stem and leaf diagram to show this information.
You must include a key.

3. PQR is a straight line. (4)

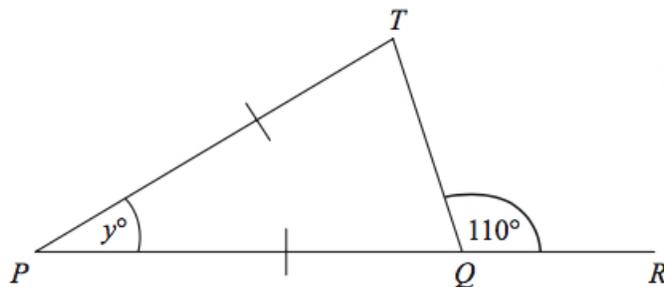
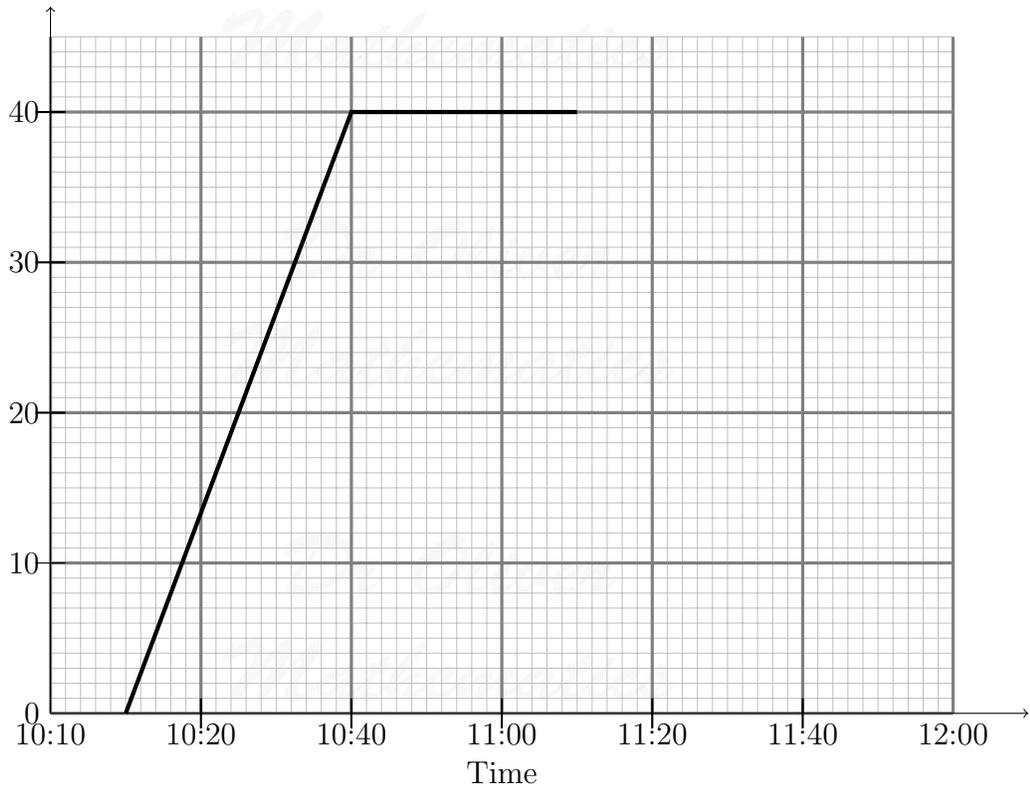


Diagram **NOT**
accurately drawn

$PT = PQ$.

- (a) Work out the value of y .
 - (b) Give reasons for your answer.
4. Nigel travelled from his home to his friend's house 40 km away.
He stayed at his friend's house for 30 minutes.
Nigel then travelled home.
Here is part of the distance-time graph for Nigel's journey.

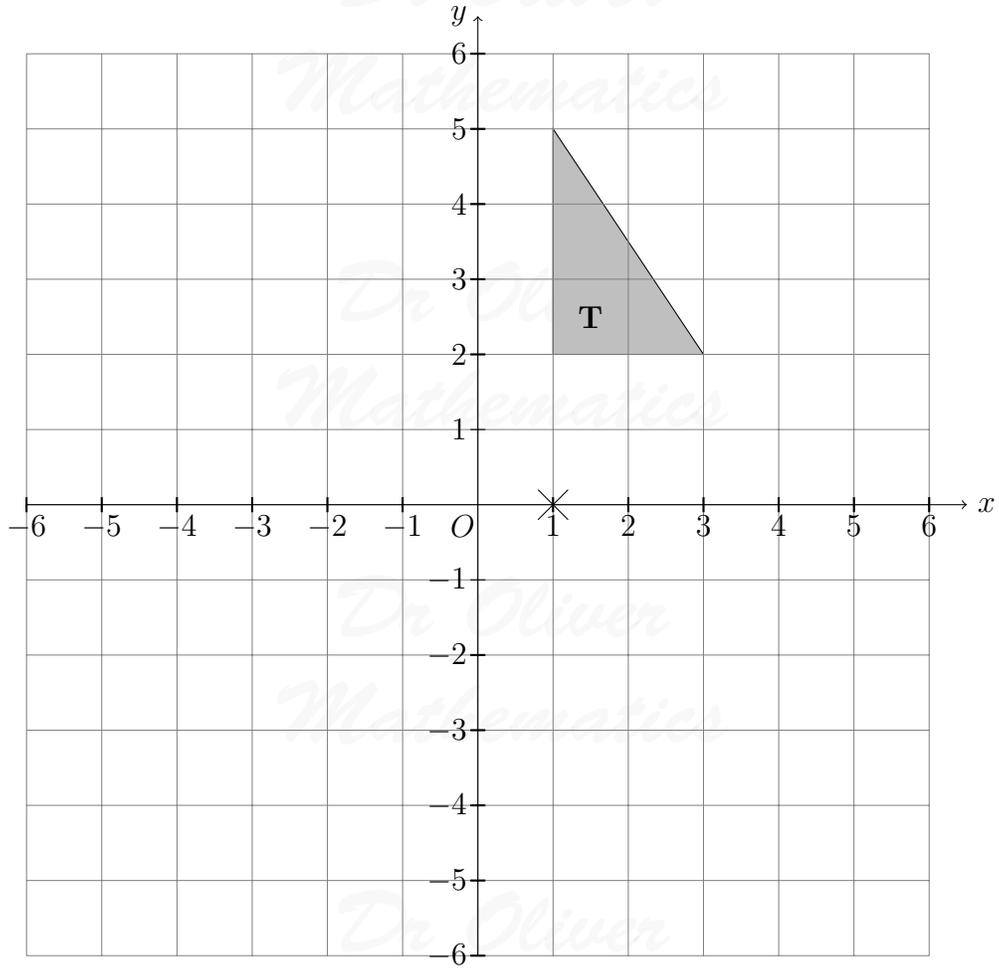
Distance from home (km)



- (a) At what time did Nigel leave home? (1)
- (b) How far was Nigel from home at 10:20? (1)

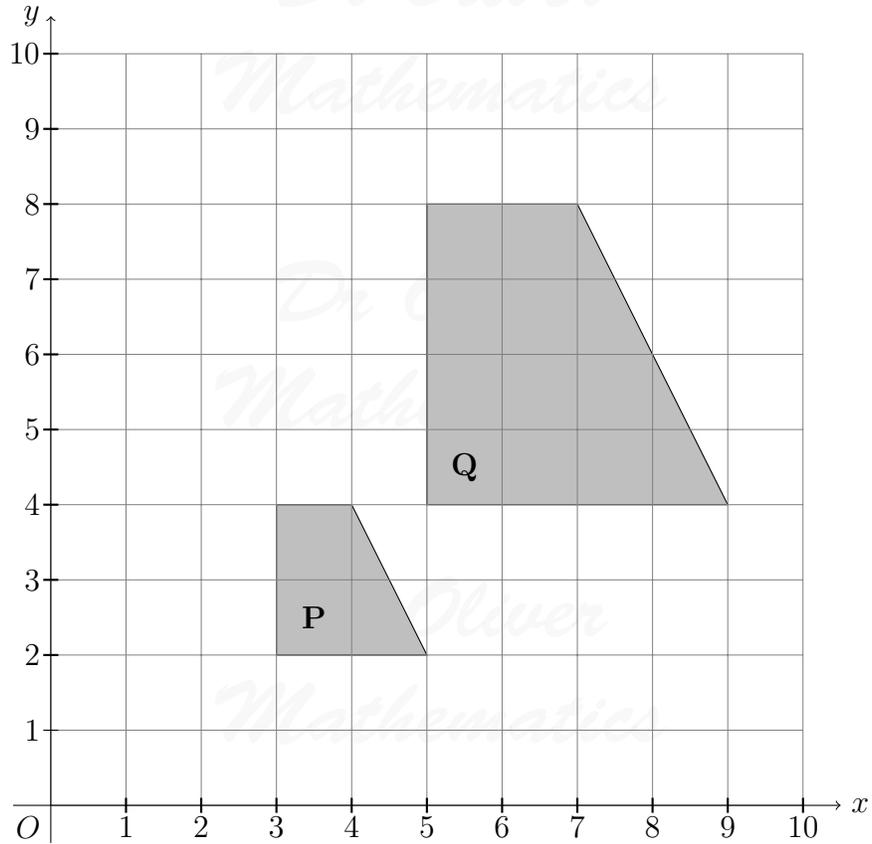
Nigel arrived home at 11:50.

- (c) Complete the distance-time graph. (1)
5. Triangle **T** has been drawn on the grid. (5)



Rotate triangle **T** 180° about the point $(1, 0)$.
Label the new triangle **A**.

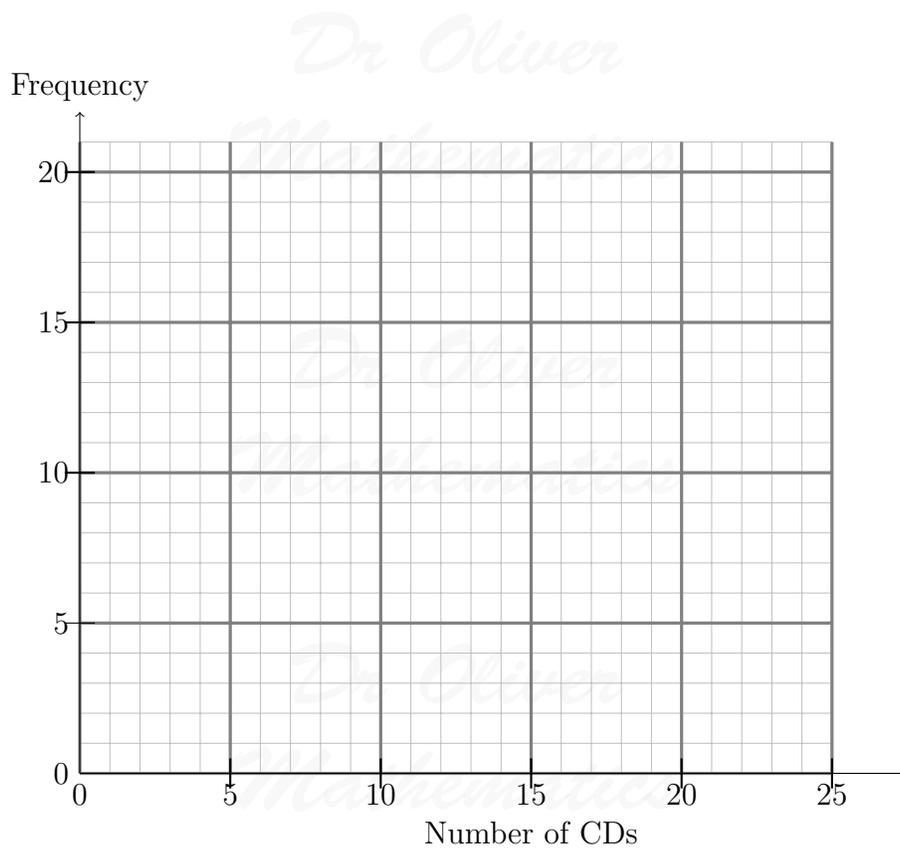
- Describe fully the single transformation which maps shape **P** onto shape **Q**.



7. Anna and Bill share £40 in the ratio 2 : 3. (3)
 Work out how much each person gets.
8. Sasha carried out a survey of 60 students.
 She asked them how many CDs they each have.
 This table shows information about the numbers of CDs these students have.

Number of CDs	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24
Frequency	8	11	9	14	18

- (a) Write down the class interval containing the median. (1)
- (b) On the grid, draw a frequency polygon to show the information given in the table. (2)



9. Work out the volume of the triangular prism. (2)

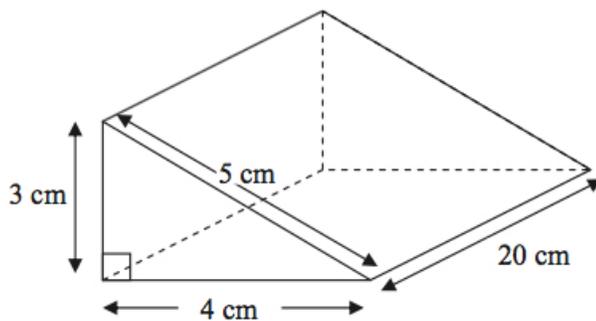


Diagram NOT
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10. Work out 4.52×36 . (3)

11. There are 300 people in the cinema. (4)

$\frac{1}{6}$ of the 300 people are boys.
 $\frac{3}{10}$ of the 300 people are girls.
 The rest of the people are adults.
 Work out how many people are adults.

12. Work out the size of an exterior angle of a regular pentagon. (2)

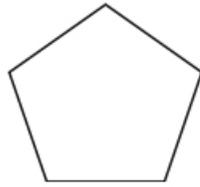


Diagram **NOT**
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13. Anil wants to find out how many DVDs people buy. (2)
He uses this question on a questionnaire.

How many DVDs do you buy?

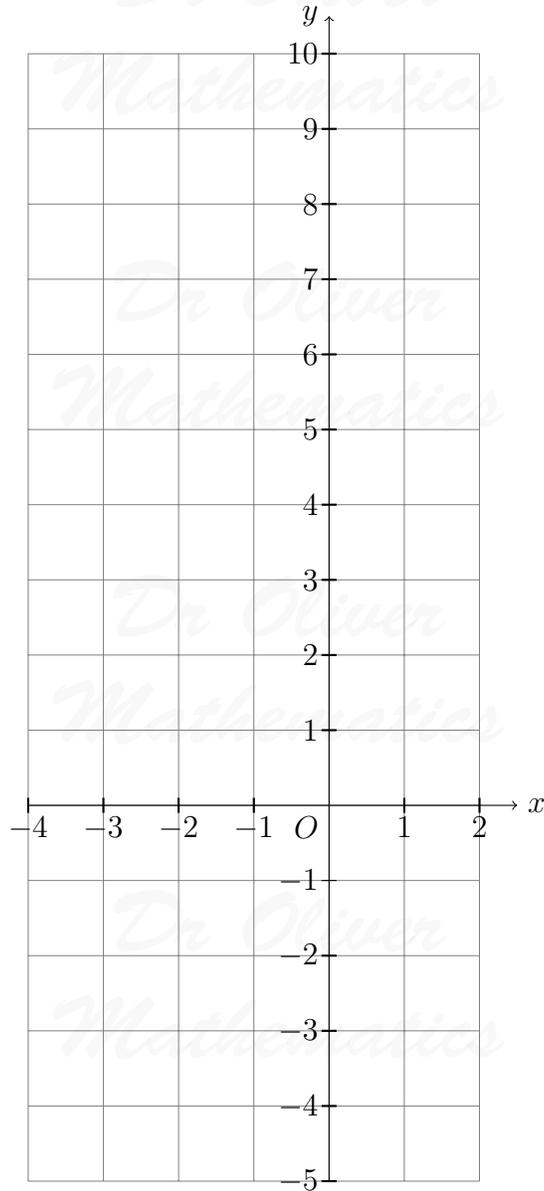
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1 – 5	5 – 10	10 – 15	15 – 20

Write down **two** different things wrong with this question.

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

x	-4	-3	-2	-1	0	1	2
y	9		-1	-3			3

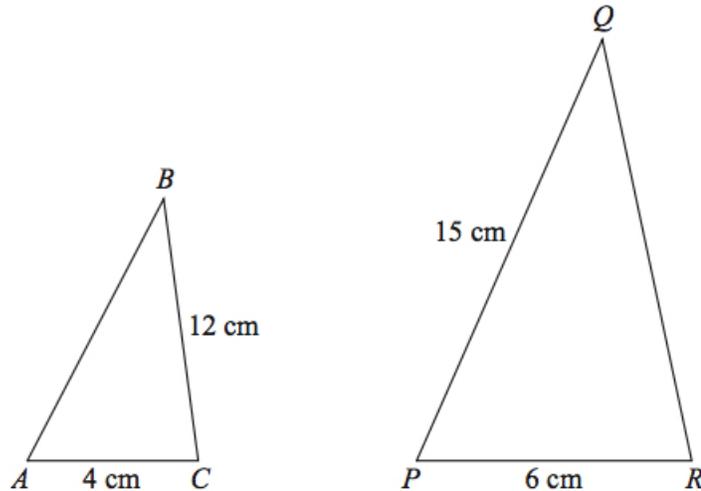
- (b) On the grid below, draw the graph of $y = x^2 + x - 3$ for values of x from -4 to 2 . (2)



- (c) Use your graph to find estimates for the solutions of $y = x^2 + x - 3$. (1)
15. Express 180 as a product of its prime factors. (3)
16. Work out (3)
- $$3\frac{1}{4} \times 2\frac{2}{3}$$
- Give your answer in its simplest form.
17. (a) Factorise $3x + 12$. (1)
- (b) Solve $4(2x - 3) = 5x + 7$. (3)

- (c) Expand and simplify $(y + 4)(y + 5)$. (2)
- (d) Factorise fully $8x^2 + 12xy$. (2)

18. Triangles ABC and PQR are mathematically similar.



Diagrams **NOT**
accurately drawn

Angle $A =$ angle P .
 Angle $B =$ angle Q .
 Angle $C =$ angle R .
 $AC = 4$ cm.
 $BC = 12$ cm.
 $PR = 6$ cm.
 $PQ = 15$ cm.

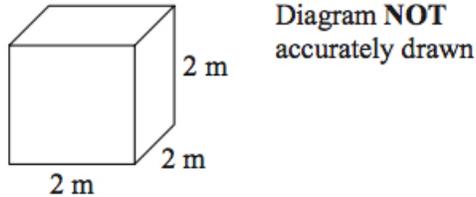
- (a) Work out the length of QR . (2)
- (b) Work out the length of AB . (2)
19. Arwen buys a car for £4000. (3)
- The value of the car depreciates by 10% each year.
- Work out the value of the car after two years.
20. (a) Here are some expressions. (2)

$$\frac{a^3 \quad a^2(c + b) \quad 4abc \quad ab + c^3 \quad 4\pi c^2}{\quad}$$

The letters a , b , and c represent lengths.
 π and 4 are numbers that have no dimension.

Two of the expressions could represent volumes.
Tick the boxes underneath these two expressions.

The volume of this cube is 8 m^3 .



(b) Change 8 m^3 into cm^3 . (2)

21. Solve the simultaneous equations (4)

$$\begin{aligned} 3x + 2y &= 8 \\ 2x + 5y &= -2. \end{aligned}$$

22. The table gives some information about the delays, in minutes, of 80 flights.

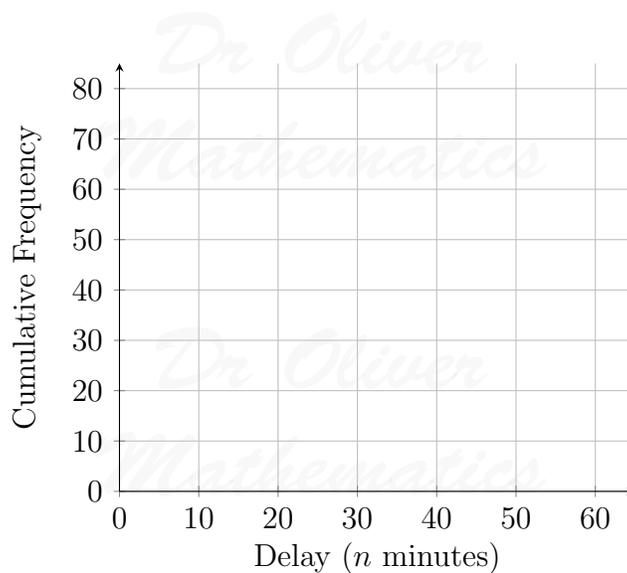
Delay (n minutes)	Frequency
$0 < n \leq 20$	16
$20 < n \leq 30$	26
$30 < n \leq 40$	23
$40 < n \leq 50$	10
$50 < n \leq 60$	5

(a) Write down the modal class interval. (1)

(b) Complete the cumulative frequency table. (1)

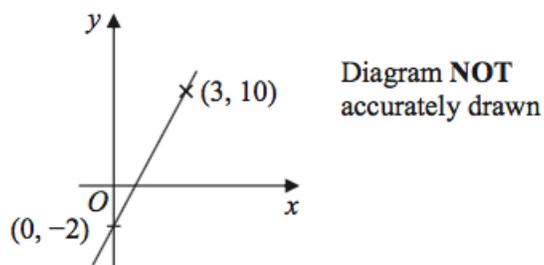
Delay (n minutes)	Cumulative Frequency
$0 < n \leq 20$	16
$0 < n \leq 30$	
$0 < n \leq 40$	
$0 < n \leq 50$	
$0 < n \leq 60$	

(c) Draw a cumulative frequency graph for your table. (2)



- (d) Use your graph to find an estimate for (3)
- (i) the median delay,
 - (ii) the interquartile range of the delays.

23. A straight line passes through $(0, -2)$ and $(3, 10)$. (3)



Find the equation of the straight line.

24. Find the value of (4)
- (a) 6^0 ,
 - (b) $64^{\frac{1}{2}}$,
 - (c) $\left(\frac{27}{8}\right)^{-\frac{2}{3}}$.

25. ABC is a right-angled triangle.
All the measurements are in centimetres.

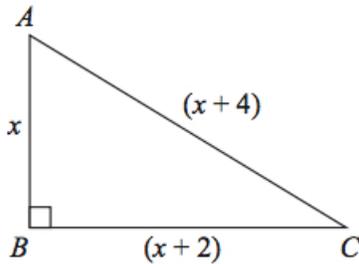


Diagram NOT
accurately drawn

$$AB = x.$$

$$BC = (x + 2).$$

$$AC = (x + 4).$$

(a) Show that $x^2 - 4x - 12 = 0$. (3)

(b) (i) Solve $x^2 - 4x - 12 = 0$. (4)

(ii) Hence, write down the length of AC .

26. There are 3 orange sweets, 2 red sweets, and 5 yellow sweets in a bag. Sarah takes a sweet at random. (4)

She eats the sweet.

She then takes another sweet at random.

Work out the probability that both the sweets are the same colour.

27. P , Q , and T are points on the circumference of a circle, centre O . (5)

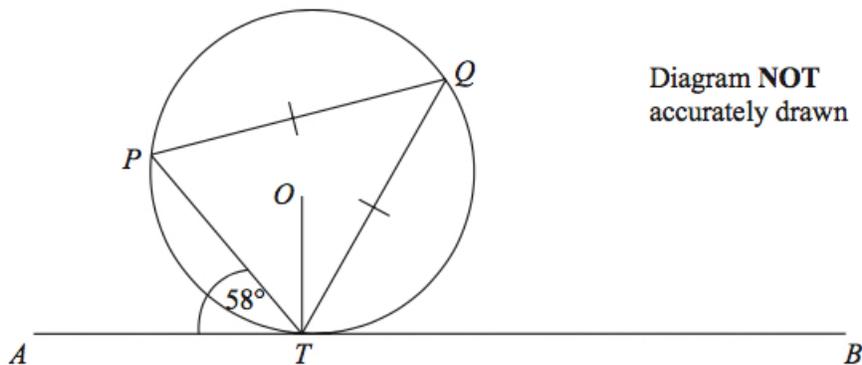


Diagram NOT
accurately drawn

The line ATB is the tangent at T to the circle.

$$PQ = TQ.$$

$$\text{Angle } ATP = 58^\circ.$$

Calculate the size of angle OTQ .

Give a reason for each stage in your working.