

Centre No.						Paper Reference	Surname <i>correction</i>	Initial(s)
Candidate No.						<b>1 3 8 0 / 3 H</b>	Signature <i>Mr Semar -</i>	

Paper Reference(s)

**1380/3H**

**Edexcel GCSE**

**Mathematics (Linear) – 1380**

**Paper 3 (Non-Calculator)**

**Higher Tier**

**Monday 7 June 2010 – Afternoon**

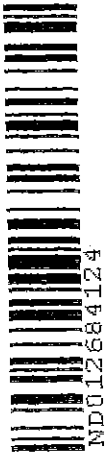
**Time: 1 hour 45 minutes**

Examiner's use only

--	--	--

Team Leader's use only

--	--	--



ND012684124

**Materials required for examination**

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.  
Tracing paper may be used.

**Items included with question papers**

Nil

**Instructions to Candidates**

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper. Answer ALL the questions. Write your answers in the spaces provided in this question paper. **You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.** If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2). There are 27 questions in this question paper. The total mark for this paper is 100. There are 24 pages in this question paper. Any blank pages are indicated. **Calculators must not be used.**

**Advice to Candidates**

Show all stages in any calculations. Work steadily through the paper. Do not spend too long on one question. If you cannot answer a question, leave it and attempt the next one. Return at the end to those you have left out.

This publication may be reproduced only in accordance with Edexcel Limited copyright policy. ©2010 Edexcel Limited.

Printer's Log. No.

**N36761A**

W850/R1380/57570 6/6/6/3



N 3 6 7 6 1 A 0 1 2 4

*Turn over*

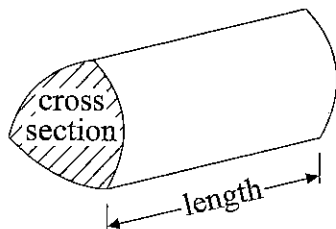
**edexcel**   
advancing learning, changing lives

# GCSE Mathematics (Linear) 1380

## Formulae: Higher Tier

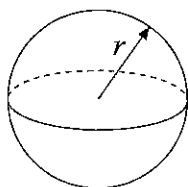
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of a prism = area of cross section  $\times$  length**



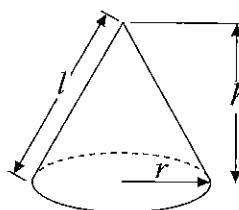
**Volume of sphere =  $\frac{4}{3}\pi r^3$**

**Surface area of sphere =  $4\pi r^2$**

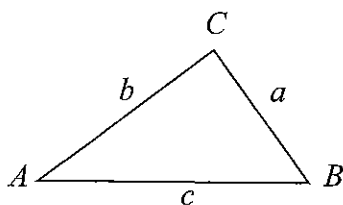


**Volume of cone =  $\frac{1}{3}\pi r^2 h$**

**Curved surface area of cone =  $\pi r l$**



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



Answer ALL TWENTY SEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Simplify

$$6x + 9y + 2x - 3y$$

$$6x + 2x + 9y - 3y$$

$$8x + 6y$$

$$8x + 6y$$

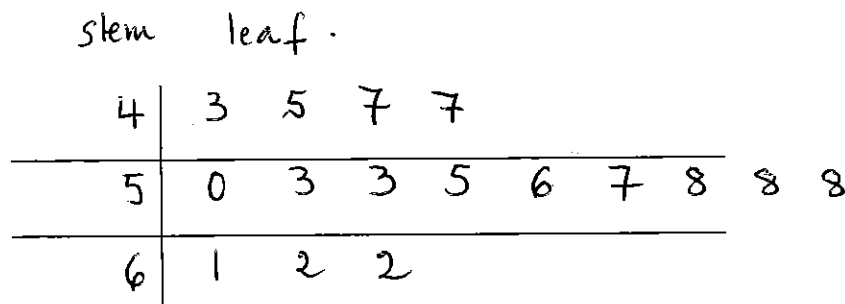
Q1

(Total 2 marks)

2. Here are the weights, in grams, of 16 eggs.

~~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.



Key: 5|7 means 57 grams

Q2

(Total 3 marks)



3.

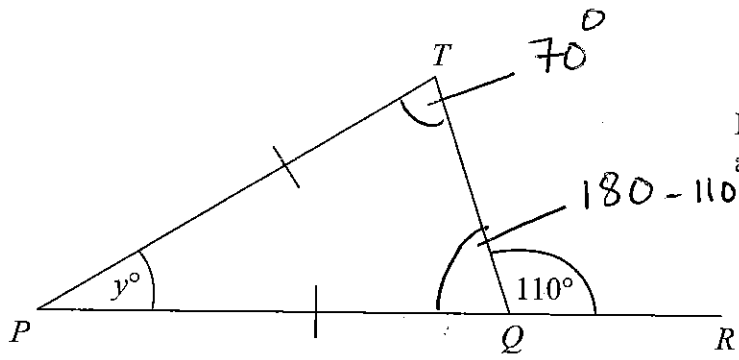


Diagram NOT accurately drawn

$PQR$  is a straight line.  
 $PT = PQ$ .

(i) Work out the value of  $y$ .

$$y^\circ + \hat{T} + \hat{Q} = 180 \quad \hat{T} = \hat{Q} = 70^\circ \text{ isosceles } \triangle$$

$$y = 180 - 2 \times 70 = 40^\circ$$

$$\hat{PQT} = 180 - 110 \text{ angles on straight line} = 70^\circ$$

$$\hat{PQT} = \hat{PTQ} = 70^\circ \text{ isosceles } \triangle \quad \underline{\quad 40^\circ \quad}$$

(ii) Give reasons for your answer.

(See above)

\* Angles in a  $\triangle$  add up to  $180^\circ$

\* " on straight line add up to  $180^\circ$

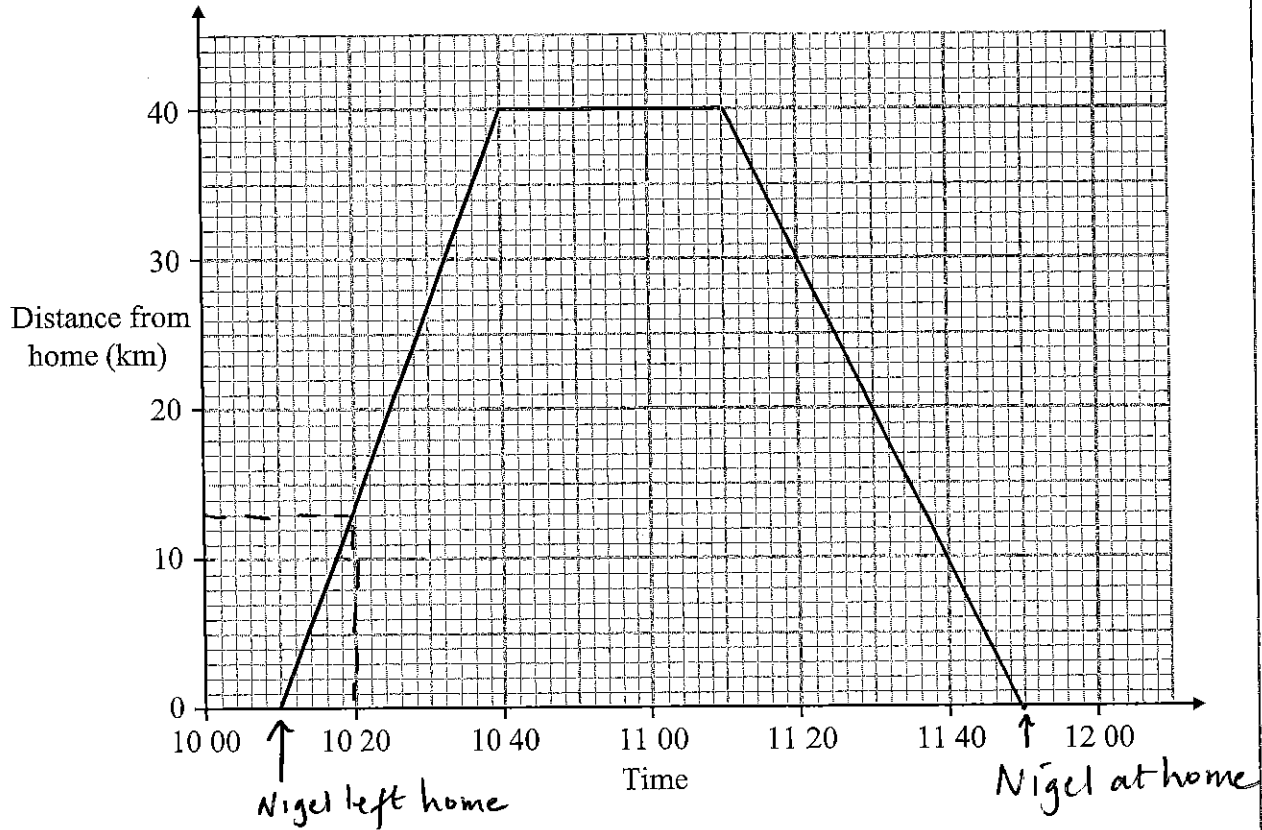
(Total 4 marks)

Q3



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.



- (a) At what time did Nigel leave home?

10.10

(1)

- (b) How far was Nigel from home at 10 20?

13

km

(1)

Nigel arrived home at 11 50

- (c) Complete the distance-time graph.

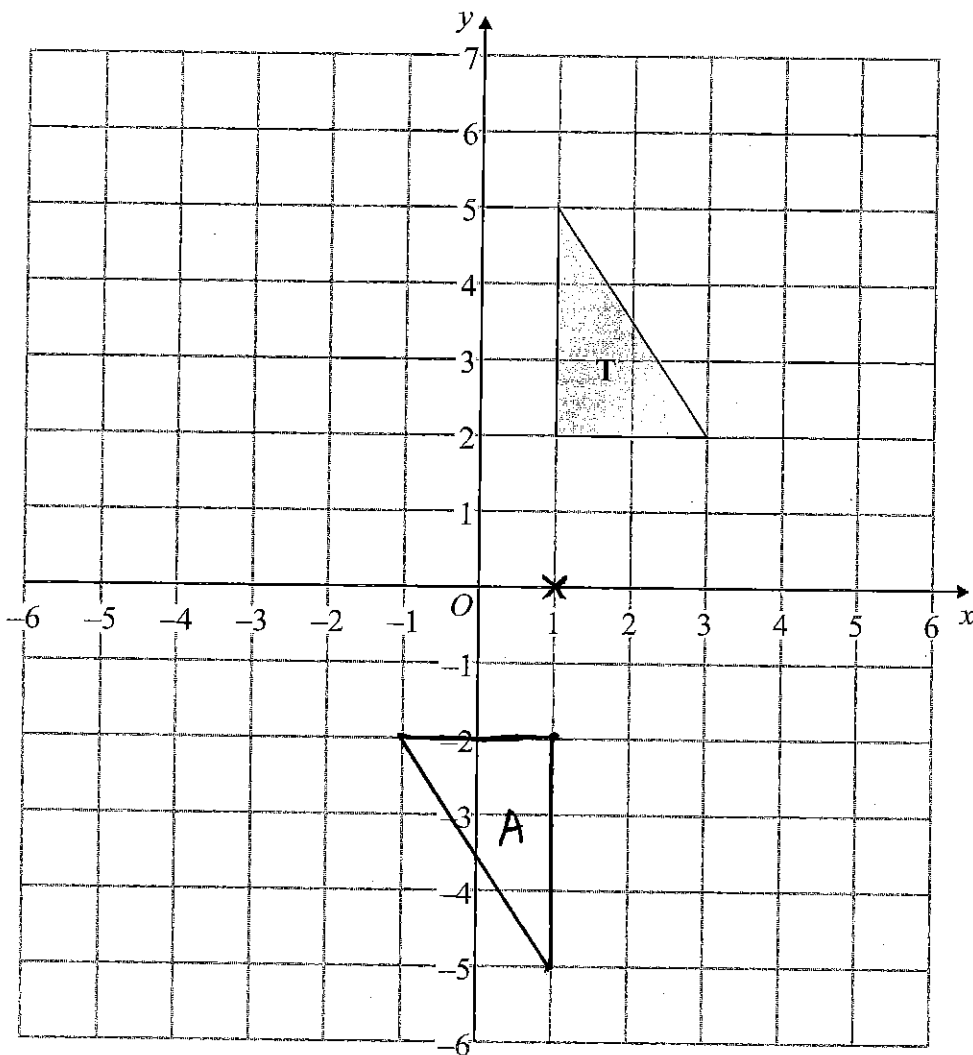
(1)

(Total 3 marks)

Q4



5.



Triangle T has been drawn on the grid.

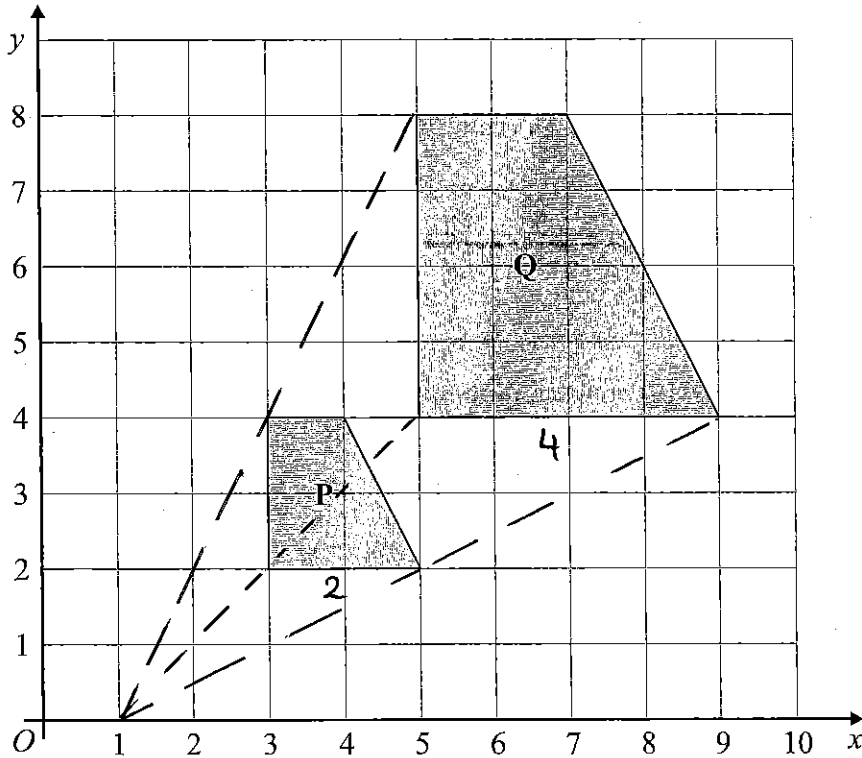
Rotate triangle T  $180^\circ$  about the point (1, 0).  
Label the new triangle A.

(Total 2 marks)

Q5



6.



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

Enlargement centre (1; 0), scale factor = 2

(Total 3 marks)

Q6

7. Anna and Bill share £40 in the ratio 2 : 3

Work out how much each person gets.

Total parts =  $2 + 3 = 5$   
 Each part is worth  $40 \div 5 = 8$   
 Anna =  $2 \times 8 = \text{£}16$   
 Bill =  $3 \times 8 = \text{£}24$

Anna    £ 16  
 Bill    £ 24

(Total 3 marks)

Q7



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.

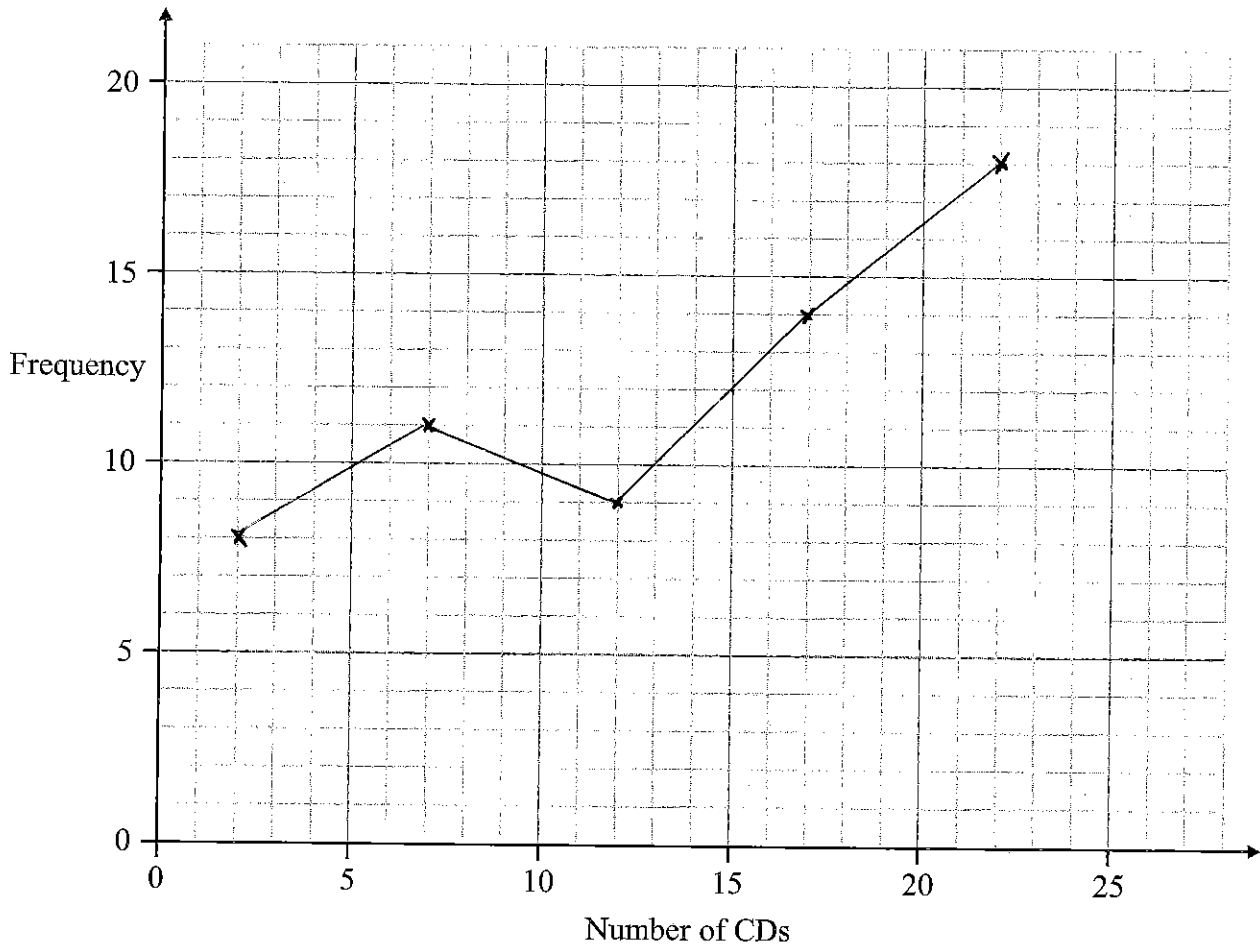
Median given by  $\frac{n+1}{2} = \frac{60+1}{2} \approx 30^{\text{th}}$  value

$8 + 11 + 9 + 14 = 42$

15 - 19

(1)

- (b) On the grid, draw a frequency polygon to show the information given in the table.



(2)

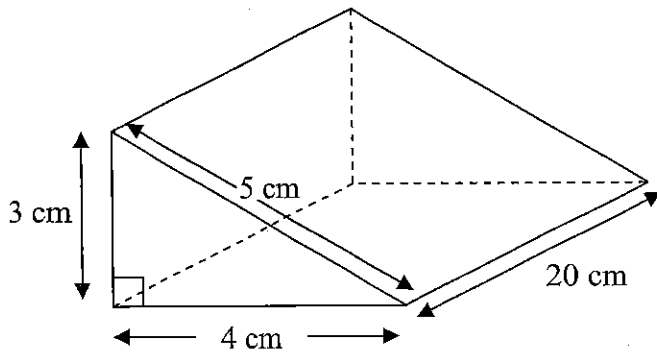
(Total 3 marks)

Q8





9.



Cross-section is a triangle  
 $\text{Area} = \frac{4 \times 3}{2} = 6$

Diagram NOT accurately drawn

Work out the volume of the triangular prism.

$$\begin{aligned} \text{Volume} &= \text{Area of cross section} \times \text{length} \\ &= \frac{3 \times 4}{2} \times 20 \\ &= 6 \times 20 = 120 \text{ cm}^3 \end{aligned}$$

..... 120 cm<sup>3</sup>

(Total 2 marks)

Q9

10. Work out  $4.52 \times 36$

$$\begin{array}{r} \phantom{3}6 \\ \times 4.52 \\ \hline \phantom{0}72 \\ \phantom{0}180 \\ \phantom{0}144 \\ \hline 162.72 \end{array}$$

..... 162.72

(Total 3 marks)

Q10



11. There are 300 people in the cinema.

$$\frac{1}{6} \text{ of the 300 people are boys. } = \frac{1}{6} \times 300 = 50 \text{ boys.}$$

$$\frac{3}{10} \text{ of the 300 people are girls. } = \frac{3}{10} \times 300 = 90 \text{ girls}$$

The rest of the people are adults.

Work out how many people are adults.

$$\begin{aligned} \text{Adults} &= 300 - (50 + 90) \\ &= 300 - 140 \\ &= 160 \end{aligned}$$

160

(Total 4 marks)

Q11

12.

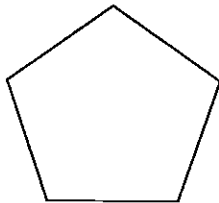


Diagram NOT accurately drawn

Work out the size of an exterior angle of a regular pentagon. ← 5 equalsides.

- Exterior angles of any polygon add up to  $360^\circ$ .
- Our pentagon is a regular one therefore  
size of an exterior angle =  $360 \div 5$   
 $= 72^\circ$

72°

(Total 2 marks)

Q12



13. Anil wants to find out how many DVDs people buy.

He uses this question on a questionnaire.

How many DVDs do you buy?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 - 5	5 - 10	10 - 15	15 - 20

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

1 ..... *Overlapping*  1-5  5-10

2 ..... *No time frame per week? Month? .. etc*  
 ..... *Not exhaustive (what about None - More than 20)*

Q13

(Total 2 marks)



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

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

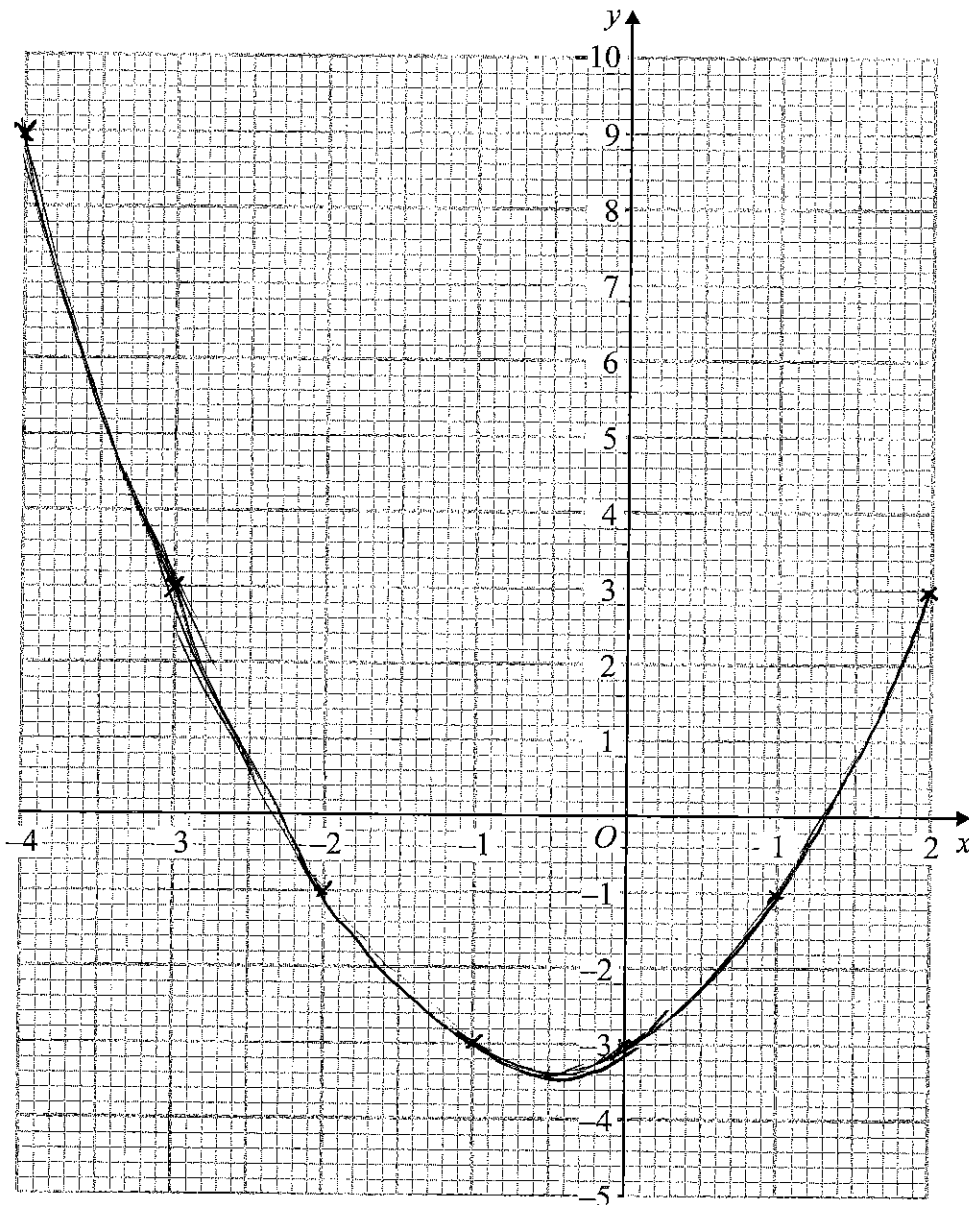
$x = -3 \quad y = -3^2 - 3 - 3 = 9 - 6 = 3$  (2)

$x = 0 \quad y = 0^2 + 0 - 3 = -3$

$x = 1 \quad y = 1^2 + 1 - 3 = 2 - 3 = -1$

(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  $x^2 + x - 3 = 0$

$$y = 0 \therefore x^2 + x - 3 = 0$$

(y coordinate is 0)

Intersection with X axis -

$$x = 1.3$$

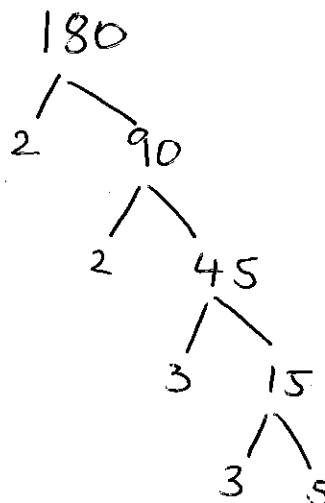
$$x = -2.3$$

(1)

Q14

(Total 5 marks)

15. Express 180 as a product of its prime factors.



$$180 = 2 \times 2 \times 3 \times 3 \times 5$$

$$2^2 \times 3^2 \times 5$$

(Total 3 marks)

Q15

16. Work out  $3\frac{1}{4} \times 2\frac{2}{3}$

Give your answer in its simplest form.

$$3\frac{1}{4} = \frac{3 \times 4 + 1}{4} = \frac{13}{4}$$

$$2\frac{2}{3} = \frac{2 \times 3 + 2}{3} = \frac{8}{3}$$

Improper

$$3\frac{1}{4} \times 2\frac{2}{3} = \frac{13}{4} \times \frac{8}{3}$$

$$\frac{13}{\cancel{4}} \times \frac{8^2}{3} = \frac{13 \times 2}{3} = \frac{26}{3} = 8\frac{2}{3}$$

$$\frac{26}{3} = 8\frac{2}{3}$$

(Total 3 marks)

Q16



17. (a) Factorise  $3x + 12$

$$3x = \underline{3} \times x$$

$$12 = \underline{3} \times 4$$

$$3(x + 4)$$

$$\underline{3(x + 4)}$$

(1)

(b) Solve  $4(2x - 3) = 5x + 7$

$$4 \times 2x - 4 \times 3 = 5x + 7$$

$$8x - 12 = 5x + 7$$

$$8x - 5x - 12 = 5x - 5x + 7$$

$$3x - 12 = 7$$

$$3x - 12 + 12 = 7 + 12$$

$$3x = 19$$

$$x = 19/3$$

$$x = \frac{19}{3} = 6\frac{1}{3}$$

(3)

(c) Expand and simplify

$$(y + 4)(y + 5)$$

$$y^2 + 5y + 4y + 20$$

$$\underline{y^2 + 9y + 20}$$

(2)

(d) Factorise fully  $8x^2 + 12xy$

$$\begin{cases} 8x^2 = 2 \times \underline{4} \times \underline{x} \times x \\ 12xy = 3 \times \underline{4} \times \underline{x} \times y \end{cases} \text{ common factor } 4x$$

$$8x^2 + 12xy = 4x(2x + 3y)$$

$$\underline{4x(2x + 3y)}$$

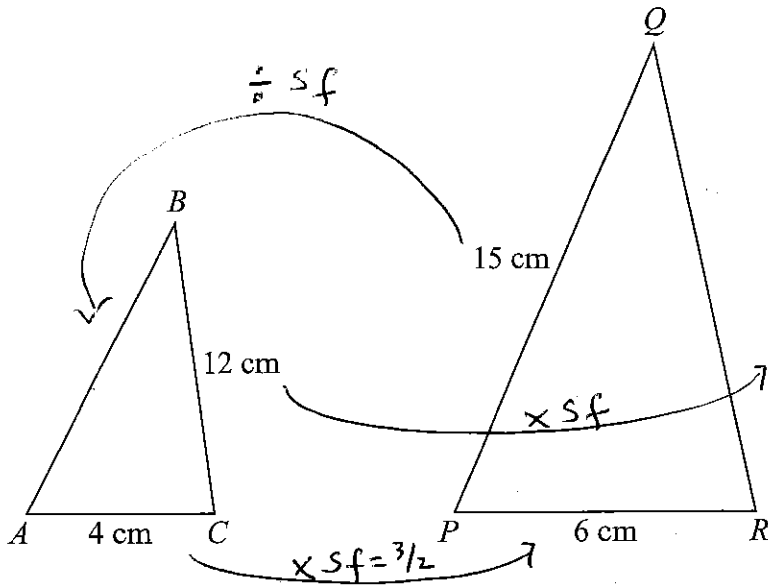
(2)

(Total 8 marks)

Q17



18.



Diagrams NOT accurately drawn

*Sf = Scale factor -*

Triangles *ABC* and *PQR* are mathematically similar.  $\Rightarrow$

$$4 \times Sf = 6$$

$$Sf = \frac{6}{4} = \frac{3}{2} = 1.5$$

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*.

$$\begin{aligned} QR &= 12 \times Sf \\ &= 12 \times \frac{3}{2} = 6 \times 3 = 18 \text{ cm} \end{aligned}$$

..... 18 ..... cm  
(2)

(b) Work out the length of *AB*.

$$\begin{aligned} AB &= 15 \div \frac{3}{2} = 15 \div 1.5 \\ &= 15 \times \frac{2}{3} \\ &= 10 \end{aligned}$$

..... 10 ..... cm  
(2)

(Total 4 marks)

Q18



19. Arwen buys a car for £4000  
The value of the car depreciates by 10% each year.

Work out the value of the car after two years.

$$100\% - 10\% = 90\% = \frac{90}{100} = 0.90$$

Number of years - 2

$$\text{After 2 years} = \text{value of car} = (0.90) \times 4000$$

$$= 3240$$

OR

After year 1 = Value =  $0.9 \times 4000$

After year 2 = Value =  $0.9$  of  $0.9 \times 4000$

$$= 0.9 \times 0.9 \times 4000 \quad \text{£ } 3240$$

$$= 0.9^2 \times 4000$$

(Total 3 marks)

Q19

20. (a) Here are some expressions.

$L = \text{Length}$

$$4abc = 4L \times L \times L = 4L^3 = \checkmark$$

$$a^2(c+b) = L^2(L+L) = L^3$$

$a^3b$	$a^2(c+b)$	$4abc$	$ab+c^3$	$4\pi c^2$
	✓	✓		

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

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

(2)

The volume of this cube is  $8 \text{ m}^3$ .

(b) Change  $8 \text{ m}^3$  into  $\text{cm}^3$ .

$$1 \text{ m} = 100 \text{ cm}$$

$$8 \text{ m} = 800 \text{ cm} = 8 \times 100 \text{ cm}$$

$$8 \text{ m}^3 = 8 \times 100 \times 100 \times 100$$

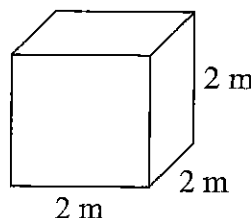


Diagram NOT accurately drawn

$$= 8 \times 100 \times 100 \times 100 \text{ cm}^3$$

$$= 8 \times 100^3 \text{ cm}^3 \quad (2)$$

(Total 4 marks)

Q20





21. Solve the simultaneous equations

$$\begin{cases} (1) & 3x + 2y = 8 & \times 2 \\ (2) & 2x + 5y = -2 & \times 3 \end{cases} \Leftrightarrow \begin{cases} 6x + 4y = 16 \\ 6x + 15y = -6 \end{cases}$$

$$\begin{array}{r} 6x + 4y = 16 \\ - \\ 6x + 15y = -6 \\ \hline 6x - 6x + 4y - 15y = 16 - -6 \\ -11y = 22 \\ y = \frac{22}{-11} = -2 \end{array}$$

IGNORE

Substitute  $y = -2$  into equation 1 will give:

$$\begin{aligned} 3x + 2(-2) &= 8 \\ 3x - 4 &= 8 \\ 3x &= 8 + 4 \\ 3x &= 12 \\ x &= \frac{12}{3} = 4 \end{aligned}$$

x = .....  
y = .....

(Total 4 marks)

Q21

$$\begin{array}{r} 6x + 4y = 16 \quad (1)' \\ - \\ 6x + 15y = -6 \quad (2)' \\ \hline 4y - 15y = 16 - -6 \\ -11y = 22 \\ y = -2 \end{array}$$

Replace  $y = -2$  into equation 1:  $3x + 2y = 8$

$$\begin{aligned} 3x + 2(-2) &= 8 \\ 3x - 4 &= 8 \\ 3x - 4 + 4 &= 8 + 4 \\ 3x &= 12 \end{aligned}$$

$$\begin{cases} x = 4 \\ y = -2 \end{cases}$$

$$x = \frac{12}{3} = 4$$

(4 marks)



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

← Highest frequency

(a) Write down the modal class interval.

$$\underline{20 < n \leq 30}$$

(1)

(b) Complete the cumulative frequency table.

Delay ( $n$ minutes)	Cumulative Frequency
$0 < n \leq 20$	16
$0 < n \leq 30$	42
$0 < n \leq 40$	65
$0 < n \leq 50$	75
$0 < n \leq 60$	80

16  
 $16 + 26$   
 $16 + 26 + 23$   
 $16 + 26 + 23 + 10$   
 $16 + 26 + 23 + 10 + 5$

(1)

(c) On the grid opposite, draw a cumulative frequency graph for your table.

(2)

(d) Use your graph to find an estimate for

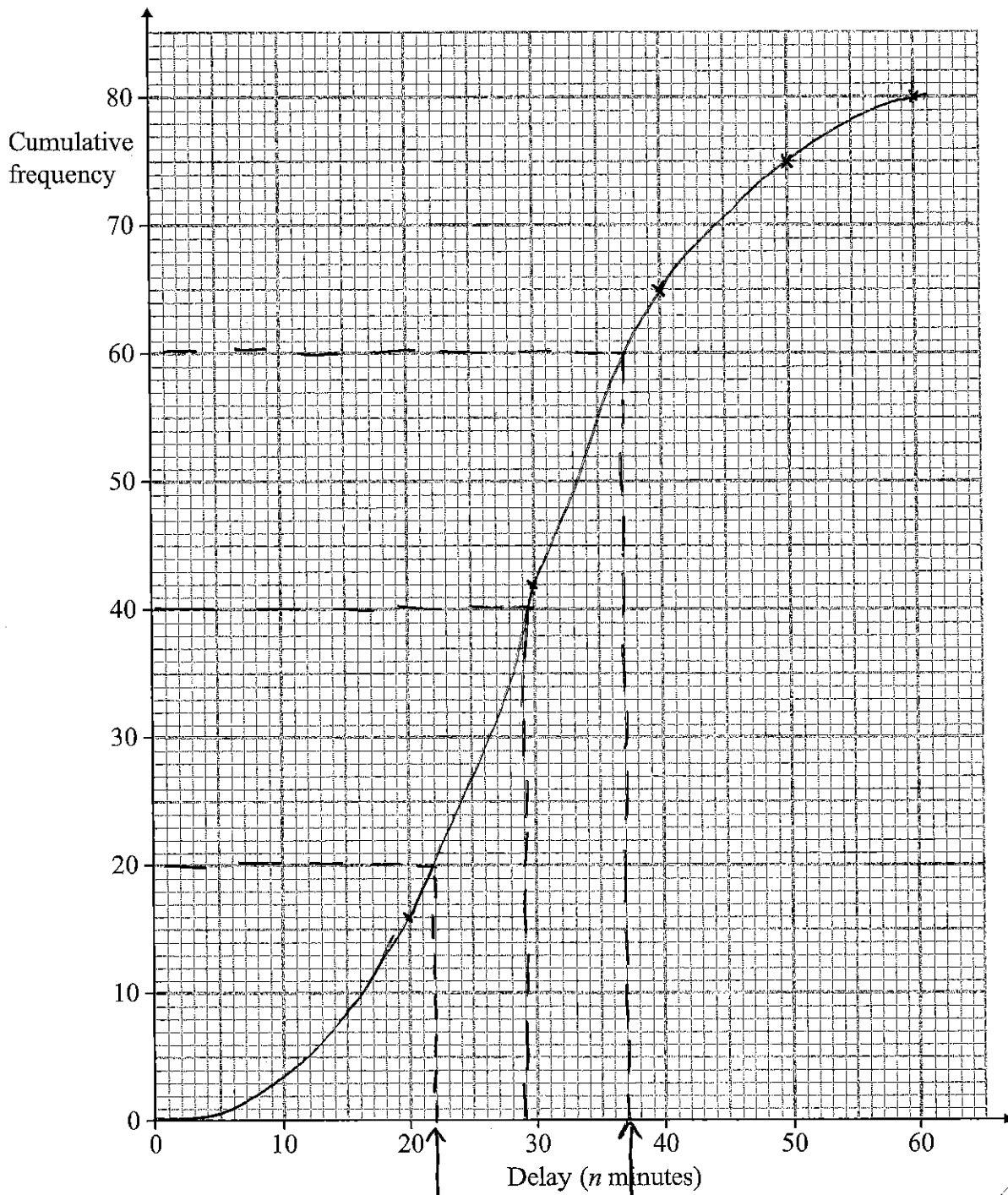
(i) the median delay,

Median given by  $\frac{n+1}{2} \approx \frac{80}{2} = 40^{\text{th}}$  Value ..... 29 ..... minutes

(ii) the interquartile range of the delays.

$IQR = \text{Upper } Q - \text{Lower Quartile} \quad 37 - 22 = 15$  ..... minutes  
 Lower  $\frac{1}{4}(n+1) \approx \frac{1}{4}n = 20^{\text{th}}$  value 22 min      Upper =  $60^{\text{th}}$  value 37 min  
 (3)





LQ = 22 mn      UQ = 37 mn      (Total 7 marks)

Q22

$$\begin{aligned}
 IQ &= UQ - LQ \\
 &= 37 - 22 \\
 &= 15 \text{ mn}
 \end{aligned}$$



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

Find the equation of the straight line.

$y = mx + c$  equation of line.

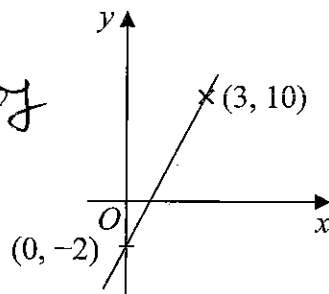


Diagram NOT accurately drawn

1) Passes through (0, -2)

$$-2 = m \times 0 + c$$

$$c = -2$$

so  $y = mx - 2$

$$\left. \begin{array}{l} m = 4 \\ c = -2 \end{array} \right\}$$

2) Passes through (3, 10)

$$10 = 3m + c$$

$$10 = 3m - 2$$

$$10 + 2 = 3m - 2 + 2$$

$$12 = 3m$$

$$m = 4$$

$$y = 4x - 2$$

$$y = 4x - 2$$

(Total 3 marks)

Q23

24. Find the value of

(i)  $6^0 = 1$

1

(ii)  $64^{\frac{1}{2}} = \sqrt{64} = 8$

8

(iii)  $\left(\frac{27}{8}\right)^{-\frac{2}{3}} = \left(\frac{8}{27}\right)^{\frac{2}{3}} = \frac{(8^{\frac{1}{3}})^2}{(27^{\frac{1}{3}})^2} = \frac{2^2}{3^2} = \frac{4}{9}$

$8^{\frac{1}{3}} = \sqrt[3]{8} = 2$

OR  $\left(\frac{27}{8}\right)^{-\frac{2}{3}} = \frac{1}{\left(\frac{27}{8}\right)^{\frac{2}{3}}} = \frac{1}{\left(\frac{27^{\frac{1}{3}}}{8^{\frac{1}{3}}}\right)^2} = \frac{1}{\frac{9}{4}} = \frac{4}{9}$

(Total 4 marks)

Q24



25.

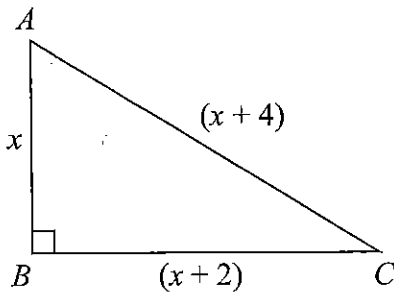


Diagram NOT accurately drawn

Applying Pythagoras theorem =

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

$$(x+4)^2 = x^2 + (x+2)^2$$

- AB = x
- BC = (x + 2)
- AC = (x + 4)

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

$$\begin{aligned} (x+4)^2 &= x^2 + (x+2)^2 \\ x^2 + 16 + 8x &= x^2 + x^2 + 4 + 4x \\ x^2 + 16 + 8x &= 2x^2 + 4 + 4x \\ 2x^2 + 4x + 4 - x^2 - 16 - 8x &= 0 \\ x^2 - 4x - 12 &= 0 \end{aligned}$$

(3)

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

using formula  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$\begin{cases} a=1 \\ b=-4 \\ c=-12 \end{cases} \quad x = \frac{+4 \pm \sqrt{16 - 4 \times 1 \times -12}}{2}$$

$$x = \frac{+4 + \sqrt{16 + 48}}{2} \quad \text{or} \quad x = \frac{+4 - \sqrt{16 - 4 \times 1 \times -12}}{2}$$

$$= \frac{+4 + \sqrt{64}}{2} = \frac{+4 + 8}{2} = 6 \quad \text{or} \quad = \frac{+4 - 8}{2} = \frac{-4}{2} = -2$$

or  $x = -2$  or  $x = +6$

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

$x = -2$  AC =  $x + 4 = -2 + 4 = 2$  (impossible)

AC = 10 cm

$x = +6$  AC =  $+6 + 4 = +10$  cm

(4)

(Total 7 marks)

Q25



26. There are 3 orange sweets, 2 red sweets and 5 yellow sweets in a bag.

Sarah takes a sweet at random.

She eats the sweet.

She then takes another sweet at random.

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

$$\text{Bag } \begin{cases} 3 \text{ orange} \\ 2 \text{ red} \\ 5 \text{ yellow} \end{cases} \quad RR \text{ or } YY \text{ or } OO \\ P(RR) + P(YY) + P(OO)$$

$$P(RR) = \frac{2}{10} \times \frac{1}{9} = \frac{2}{90}$$

$$P(YY) = \frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$$

$$P(OO) = \frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$$

$$P(\text{Same color}) = \frac{2}{90} + \frac{20}{90} + \frac{6}{90} = \frac{28}{90} = \frac{14}{45}$$

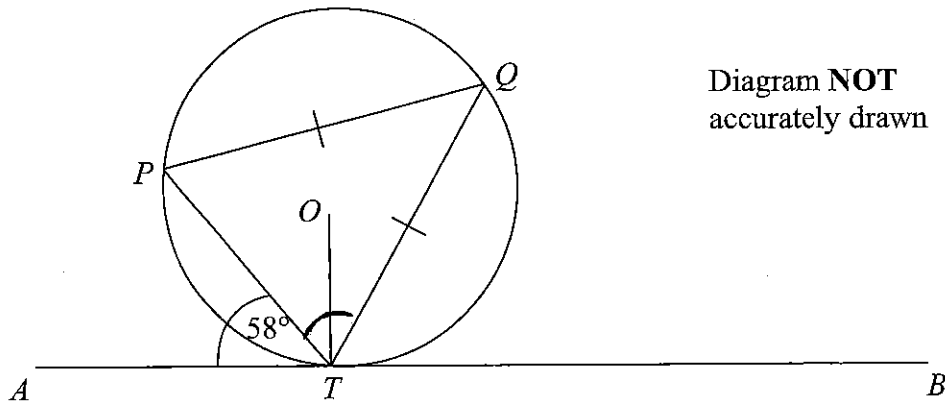
$$\frac{28}{90} = 0.31$$

(Total 4 marks)

Q26



27.



$P$ ,  $Q$  and  $T$  are points on the circumference of a circle, centre  $O$ .  
The line  $ATB$  is the tangent at  $T$  to the circle.

$PQ = TQ$ .  
Angle  $ATP = 58^\circ$ .

Calculate the size of angle  $OTQ$ .  
Give a reason for each stage in your working.

$$\angle PQT = 58^\circ \text{ (alternate segment theorem)}$$

$$\triangle PQT \text{ isosceles } \therefore \hat{P}TQ = (180 - 58) \div 2$$

$$= 122 \div 2 = 61^\circ$$

$$\begin{aligned} \angle OTQ &= \angle ATQ - \angle ATO \\ &= (58 + 61) - 90 \\ &= 119 - 90 \\ &= 29^\circ \end{aligned}$$

29°

(Total 5 marks)

Q27

TOTAL FOR PAPER: 100 MARKS

END



**BLANK PAGE**

