

# Gold Level

## Model Answers 4

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Difficulty Level	Gold
Booklet	Model Answers 4

**Time Allowed:** 57 minutes

**Score:** / 47

**Percentage:** /100

1

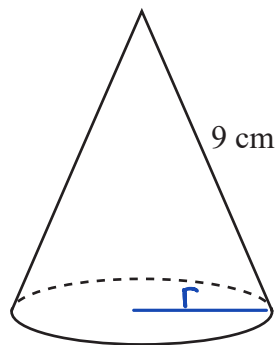


Diagram **NOT**  
accurately drawn

A solid cone has a slant height of 9 cm.  
The **curved** surface area of the cone is  $100 \text{ cm}^2$ .

Calculate the volume of the cone.  
Give your answer correct to 3 significant figures.

Curved surface area =  $\pi r$  (slant height)

$$\pi(9)(r) = 100$$

$$r = 100/9\pi$$

$$r = 3.536\dots$$

Using Pythagoras,

$$9^2 - r^2 = h^2$$

$$h = \sqrt{81 - 12.5\dots}$$

$$h = 8.27\dots$$

Volume of cone :

$$\pi/3 r^2 h = \pi/3 (3.53\dots)(3.53\dots)(8.27\dots) = 108$$

.....108.....  $\text{cm}^3$

(Total for Question is 5 marks)

2 (a) Simplify  $(16y^8)^{\frac{3}{4}}$

$$16^{\frac{3}{4}} y^{(8)\frac{3}{4}}$$

$$2^3 y^{2 \times 3}$$

$$8y^6$$

$$\frac{8y^6}{(2)}$$

(b) Given that  $2^p \times 8^q = 2^n$

express  $n$  in terms of  $p$  and  $q$ .

$$2^p \times 2^{3q} = 2^n$$

$$p+3q = n$$

$$n = \frac{p+3q}{(2)}$$

(Total for Question is 4 marks)

3

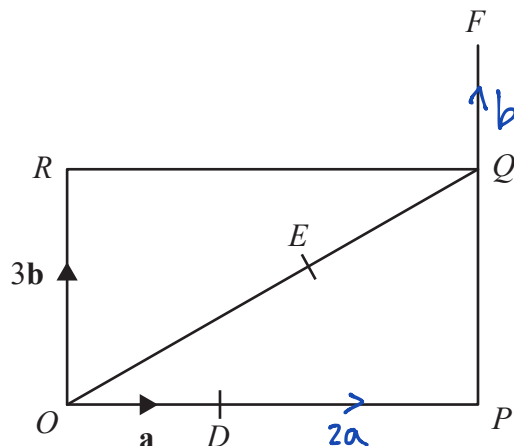


Diagram **NOT** accurately drawn

$OPQR$  is a rectangle.

$D$  is the point on  $OP$  such that  $OD = \frac{1}{3} OP$ .

$E$  is the point on  $OQ$  such that  $OE = \frac{2}{3} OQ$ .

$PQF$  is the straight line such that  $QF = \frac{1}{3} PQ$ .

$\vec{OD} = \mathbf{a}$      $\vec{OR} = 3\mathbf{b}$

(a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ ,

(i)  $\vec{OQ}$

$3\mathbf{a} + 3\mathbf{b}$

---

(ii)  $\vec{OE}$

$2\mathbf{a} + 2\mathbf{b}$

---

(iii)  $\vec{DE}$

$\mathbf{a} + 2\mathbf{b}$

---

(3)

(b) Use a vector method to prove that  $DEF$  is a straight line.

$$DE = DO + OD = -\mathbf{a} + 2\mathbf{a} + 2\mathbf{b} = \mathbf{a} + 2\mathbf{b}$$

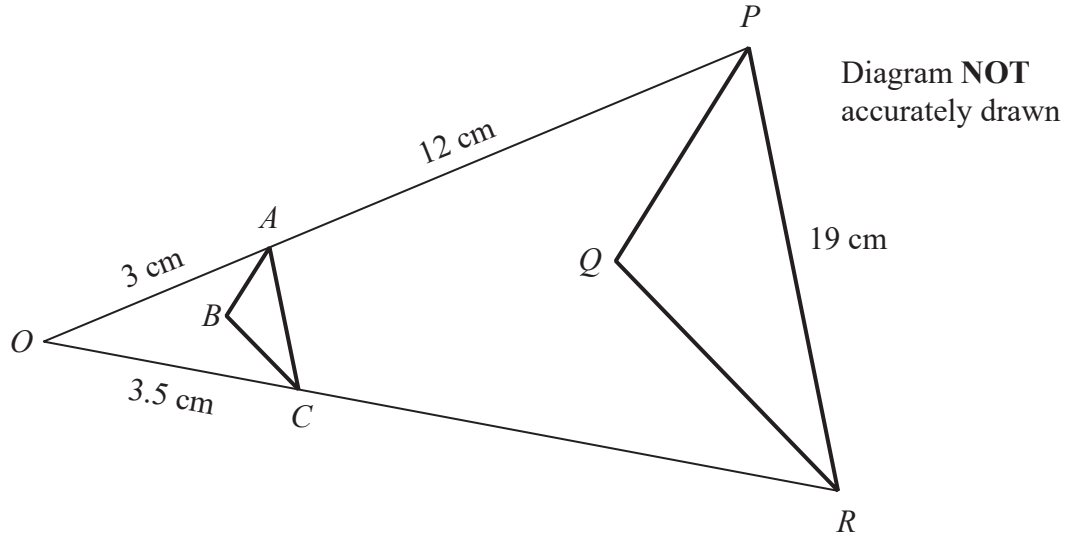
$$DF = DO + OQ + QF = -\mathbf{a} + 3\mathbf{a} + 3\mathbf{b} + \mathbf{b} = 2(\mathbf{a} + 2\mathbf{b})$$

$DF, DE$  go through the same point (D) and have the same gradient, so they lie on a straight line.

(2)

**(Total for Question is 5 marks)**

4



Triangle  $PQR$  is an enlargement, centre  $O$ , of triangle  $ABC$ .  
 $OAP$  and  $OCR$  are straight lines.

- $OA = 3$  cm.
- $AP = 12$  cm.
- $OC = 3.5$  cm.
- $PR = 19$  cm.

(a) Work out the length of  $CR$ .

$$SF = \frac{12}{3} = 4 \quad 3.5 \times 4 = \underline{\underline{14}}$$

..... cm  
 (2)

(b) Work out the length of  $AC$ .

$$SF = \frac{19}{3} \quad 19 = AC \times 5$$

$$\frac{19}{5} = AC = \underline{\underline{3.8}}$$

..... cm  
 (3)

The area of triangle  $ABC$  is  $2$  cm<sup>2</sup>

(c) Work out the area of triangle  $PQR$ .

$$\text{Area} = \text{length}^2$$

$$\therefore SF \text{ of Area} = (SF \text{ of length})^2$$

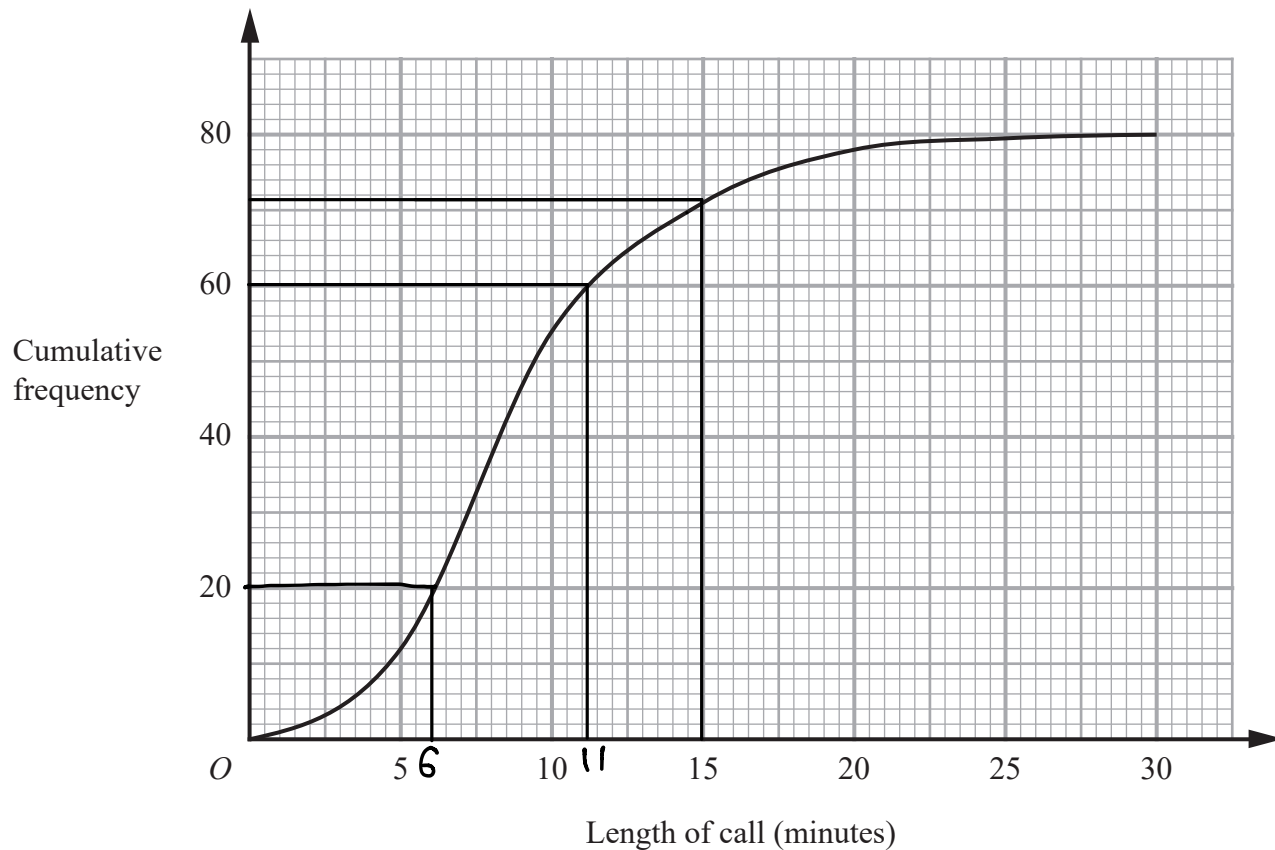
$$\therefore A_2 = 5^2 \times 2$$

$$\therefore A_2 = \underline{\underline{50}}$$

..... cm<sup>2</sup>  
 (2)

(Total for Question is 7 marks)

- 5 The cumulative frequency graph gives information about the lengths, in minutes, of 80 telephone calls.



- (a) Find an estimate for the number of calls which were longer than 15 minutes.

$$80 - 71 = 9$$

9  
(2)

- (b) Find an estimate for the interquartile range of the lengths of the 80 calls.

$$11 - 6 = \underline{\underline{5}}$$

5 minutes  
(2)

(Total for Question is 4 marks)

6

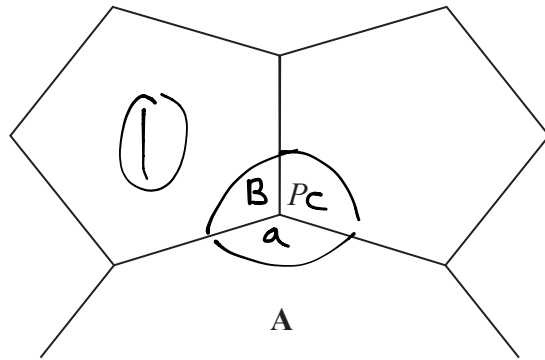


Diagram NOT  
accurately drawn

The diagram shows two congruent regular pentagons and part of a regular  $n$ -sided polygon  $A$ .

Two sides of each of the regular pentagons and two sides of  $A$  meet at the point  $P$ .

Calculate the value of  $n$ .

Show your working clearly.

$$\text{internal angle} = \frac{(n-2)(180)}{n}$$

$$\textcircled{1} \quad \frac{(5-2) \times 180}{5} = 108^\circ$$

$$\textcircled{2} \quad B + C + a = 360$$

$$B, C = 108^\circ$$

$$360 - 216 = a = 144^\circ$$

$$\textcircled{3} \quad 144 = \frac{180(n-2)}{n} \rightarrow n(144) = 180n - 360$$

$$\rightarrow 360 = 36n$$

$$\therefore n = 10$$

$$n = \dots\dots\dots 10$$

(Total for Question is 5 marks)



7

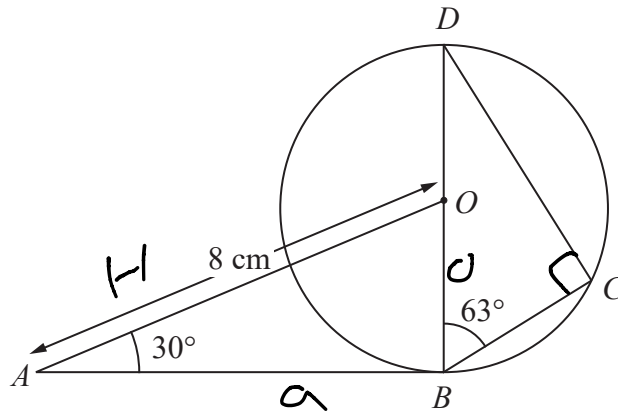


Diagram **NOT** accurately drawn

$B$ ,  $C$  and  $D$  are points on a circle, centre  $O$ .

$BOD$  is a diameter of the circle.

$AB$  is the tangent to the circle at  $B$ .

$AO = 8$  cm.      Angle  $BAO = 30^\circ$       Angle  $CBD = 63^\circ$

Calculate the length of  $BC$ .

Give your answer correct to 3 significant figures.

$\triangle AOB$      $\triangle DCB$      $\triangle DOB$

$$\sin(30^\circ) \times 8 = 4 = OB$$

$$DB = 2 \times OB$$

$$DB = 8$$

$\angle DCB = 90^\circ$  as  $\angle DOB = 180^\circ$   
(angle at center vs circumference)

$$8 \times \cos(63^\circ) \approx \underline{\underline{3.63}}$$

..... cm

(Total for Question is 4 marks)

- 8 The population of India increased by 20% between 1989 and 1999.  
The population of India increased by a further 17% between 1999 and 2009.

Calculate the percentage by which the population of India increased between 1989 and 2009.

20% increase in 10 yrs

17% in next 10 yrs

$$1.2 \times 1.17 = \underline{\underline{1.404}}$$

$$= \underline{\underline{40.4\%}}$$

..... %

(Total for Question is 3 marks)

- 9 (a) Simplify  $(3a^2b)^4$

$$\begin{aligned} & 3^4(a^2)^4(b)^4 \\ & = \underline{\underline{81a^8b^4}} \end{aligned}$$

$$\underline{\underline{81a^8b^4}}$$

(2)

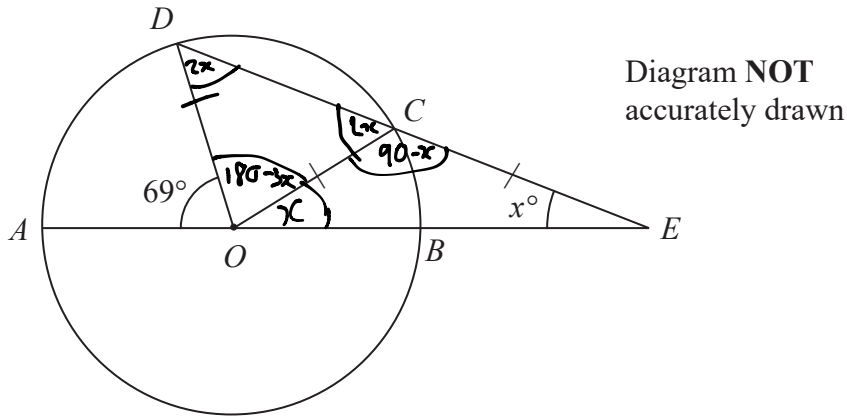
- (b) Simplify  $(9c^8)^{\frac{1}{2}}$

$$\begin{aligned} & \sqrt{9} \times c^4 \\ & 3 \times c^4 \end{aligned}$$

$$\underline{\underline{3c^4}}$$

(2)

(Total for Question is 4 marks)



$A, B, C$  and  $D$  are points on a circle, centre  $O$ .  
 $AOBE$  and  $DCE$  are straight lines.  
 $CO = CE$ .  
 Angle  $AOD = 69^\circ$   
 Angle  $CEO = x^\circ$

Calculate the value of  $x$ .  
 Show your working clearly.

$$COE = x$$

$$OCE = 180 - 2x$$

$$= \underline{90 - x}$$

$$DCO = 180 - (180 - 2x)$$

$$= 2x$$

$$CDO = 2x \rightarrow \text{as isosceles}$$

$$DOC = 180 - 4x$$

$$180^\circ = 69 + 2x + (180 - 4x)$$

$$0 = 69 - 2x$$

$$2x = 69^\circ$$

$$x = 34.5^\circ$$

$$x = \underline{34.5^\circ}$$