Gold Level

Model Answers 1

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Difficulty Level	Gold
Booklet	Model Answers 1

Time Allowed: **60 minutes**

Score: **/ 50**

Percentage: **/100**

1 $y = 1.8$ correct to 1 decimal place.

Calculate the lower bound for the value of $4y + 1$

y is less than 1·85

y is greater than or equal to

1·75
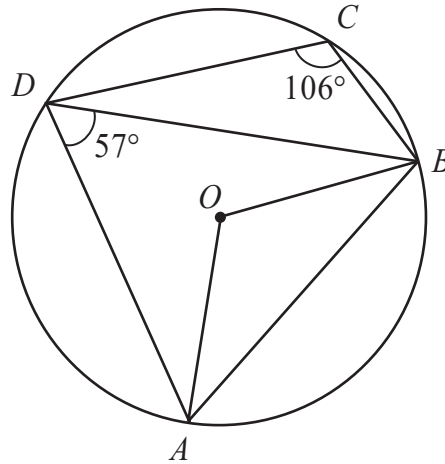
$4 (1·75)^{4·} + 1 =$

8

(Total for Question is 2 marks)

2

Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
Angle *ADB* = 57°.
Angle *BCD* = 106°.

(a) (i) Calculate the size of angle *AOB*.

$$AOB = 2(ADB)$$

$$\therefore AOB = \underline{114} \,°$$

(ii) Give a reason for your answer.

Angle at the center is twice the angle at the circumference

(2)

(b) Calculate the size of angle *BAD*.

opposite angles in a cyclic quadrilateral add to 180°

$$\therefore 106 + BAD = 180$$

$$\therefore BAB = \underline{74}\,°$$

(1)

(Total for Question is 3 marks)

3 P is directly proportional to the cube of Q.
When $Q = 15$, $P = 1350$

(a) Find a formula for P in terms of Q.

$$P \propto Q^3$$

$$\therefore P = k \times Q^3$$

Where k is a constant.

$P = \dfrac{0.4Q^3}{}$

(3)

(b) Calculate the value of P when $Q = 20$

$$\frac{P}{Q^3} = k = \frac{1350}{15^3} = 0.4$$

$$P = 0.4Q^3 = 0.4(20^3)$$

$$\therefore P = 3200$$

$P = 3200$

(1)

(Total for Question is 4 marks)

4 $x = a \times 10^n$ where n is an integer and $\sqrt{0} \leqslant a < 10$

Find, in standard form, an expression for x^2.
Give your expression as simply as possible.

$$x^2 = a^2 \times 10^{2n}$$

divide a^2 by 10, add one to index

$$x^2 = \frac{a^2}{10} \times 10^{2n+1}$$

....
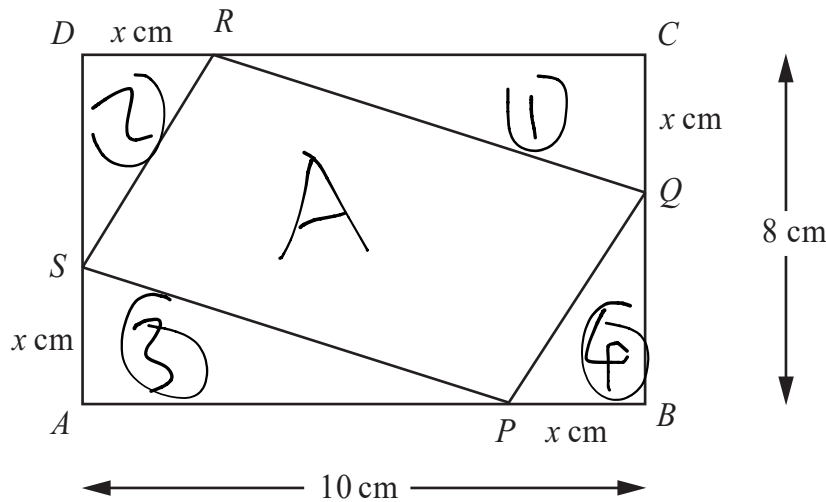
(Total for Question is 3 marks)

5

Diagram **NOT**
accurately drawn

ABCD is a rectangle.
AB = 10 cm.
BC = 8 cm.
P, Q, R and S are points on the sides of the rectangle.
BP = CQ = DR = AS = x cm.

(a) Show that the area, A cm², of the quadrilateral PQRS is given by the formula

$$A = 2x^2 - 18x + 80$$

Area of ABCD = 80

$A = 80 - ① - ② - ③ - ④$

$A = 80 - \frac{1}{2}(x)(10-x) - \frac{1}{2}(x)(8-x) - \frac{1}{2}(x)(10-x)$

$-\frac{1}{2}(x)(8-x)$

$= 80 - (x)(10-x) - x(8-x)$

$= 80 - (10x - x^2) - (8x - x^2)$

$= 80 - 10x + x^2 - 8x + x^2$

$A = 80 - 18x + 2x^2$

$A = 2x^2 - 18x + 80$ ← as shown above

(3)

(b) For $A = 2x^2 - 18x + 80$

(i) find $\dfrac{\mathrm{d}A}{\mathrm{d}x}$,

lower the power by one and multiply

$(2x) \times 2 - 18(1)x^0 + 0 \qquad = 4x - 18$

(ii) find the value of x for which A is a minimum.

$4x - 18 = 0$

$4x = 18$

$x = 4.5$

$x = 4.5$

(iii) Explain how you know that A is a minimum for this value of x.

Second derevatve $= 4$, which is positive

$\therefore$ minimum

(5)

(Total for Question is 8 marks)

6 Solve the simultaneous equations

① $y = 2x - 3$

② $x^2 + y^2 = 2$

Sub ① into ②

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

Foil

$x^2 + 4x^2 - 12x + 9 = 2$

collect terms.

$5x^2 - 12x + 9 = 2$ $_{-2}$

Factorise $5x^2 - 12x + 7 = 0$

$(5x - 7)(x - 1) = 0$ / or use Quadratic formula

$\therefore x = \dfrac{7}{5}$ or 1

If $x = 1$, $y = 2(1) - 3 = -1$

if $x = \dfrac{7}{5}$, $y = 2\left(\dfrac{7}{5}\right) - 3 = -\dfrac{1}{5}$

$(1, -1)$ $\left(\dfrac{7}{5}, -\dfrac{1}{5}\right)$
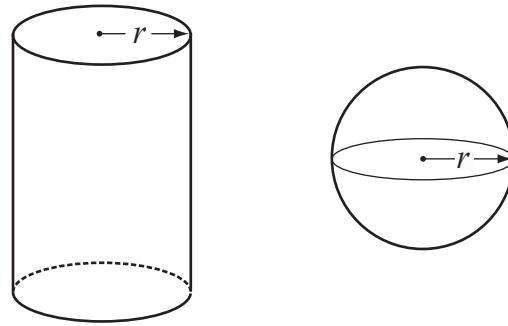
(Total for Question is 6 marks)

7

Diagram **NOT** accurately drawn

The diagram shows a solid cylinder and a solid sphere.
The cylinder has radius r.
The sphere has radius r.

Given that $\dfrac{\textbf{Total } \text{surface area of cylinder}}{\text{Surface area of sphere}} = 2$

find the value of $\dfrac{\text{Volume of cylinder}}{\text{Volume of sphere}}$ ②

$$\dfrac{h \times \pi r^2}{\frac{4}{3}\pi r^3}$$

SA of cylinder = top + bottom + middle $= \pi r^2 + \pi r^2 + 2\pi rh$

$= 2\pi r^2 + 2\pi rh$

SA of Sphere $= 4\pi r^2$

$\therefore \dfrac{2\pi r^2 + 2\pi rh}{4\pi r^2} = 2$

$2\pi r^2 + 2\pi rh = 4(2)\pi r^2$
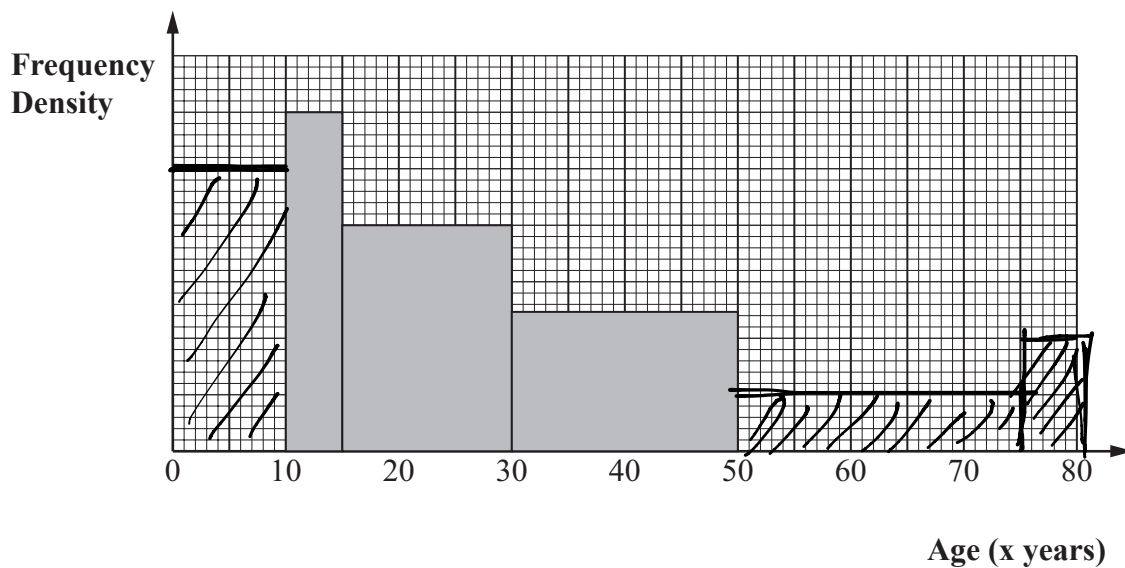
$r^2 + rh = 4r^2$

$= 4r^2 - rh - r^2 = 0$

$3r^2 - rh = 0$

$r(3r - h) = 0$

$\therefore r = 0, \text{ or } r = \dfrac{h}{3}$

Sub back in to ②

$\rightarrow \dfrac{\pi r^2(3r)}{\frac{4}{3}\pi r^3} \rightarrow \dfrac{9}{4}$

(Total for Question is 5 marks)

8 The incomplete histogram and table give information about the ages of people living in a village.

Age (x years)

Age (*x* years)	Frequency
$0 \leqslant x < 10$	100
$10 \leqslant x < 15$	60
$15 \leqslant x < 30$	120
$30 \leqslant x < 50$	160
$50 \leqslant x < 75$	50
$75 \leqslant x < 80$	20

(i) Use the histogram to complete the table.

(ii) Use the table to complete the histogram.

(Total for Question is 4 marks)

9 Alan has to attend a meeting on Monday and on Tuesday.

The probability that he is late for a meeting is $\frac{1}{8}$

(a) Complete the probability tree diagram.

(3)

Monday meeting   Tuesday meeting

late $\frac{1}{64}$ L, L

$\frac{1}{8}$ late $\frac{7}{8}$

not late $\frac{7}{64}$ L, NL

$\frac{1}{8}$ late $\frac{7}{64}$ NL, L

$\frac{7}{8}$ not late

$\frac{7}{8}$

not late $\frac{49}{64}$ NL, NL
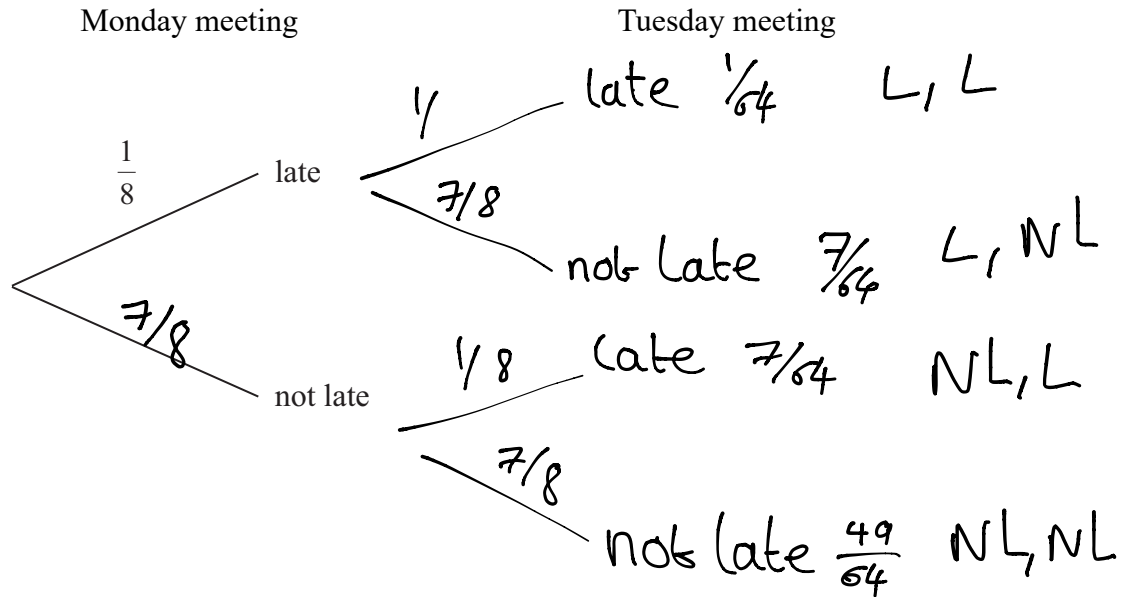
(b) Calculate the probability that Alan is late for at least one of these meetings.

$$\text{late} + \text{not late} \quad \text{or } 1 - \frac{49}{64}$$

$$+ \quad \text{not late} + \text{late} \quad \frac{15}{64}$$

$$+ \quad \text{late} + \text{late}$$

(3)

(Total for Question is 6 marks)

10 Show that the recurring decimal $0.3\dot{9}\dot{6} = \dfrac{44}{111}$

$$x = 0.396396$$

$$1000x = 396.396$$

$$-x \downarrow \quad 999x = 396.0$$

$$x = \frac{396}{999} = \frac{44}{111}$$

(Total for Question is 2 marks)

11 $f(x) = \dfrac{2}{x}$

   $g(x) = \dfrac{x+1}{x}$

(a) State which value of x cannot be included in the domain of f or g.

If $x = 0$ then

$g(x)$ & $f(x)$ are undefined

$x = $ Zero

(1)

(b) Solve $gf(a) = 3$

$g(f(a)) = 3$, $\dfrac{\left(\frac{2}{a}+1\right)}{2/a} = 3,\ \dfrac{2}{a}+1 = \dfrac{6}{a}$

$1 + \dfrac{a}{2} = 3$

$\therefore a = 4$

$a = \underline{4}$

(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x)$

$y = \dfrac{x+1}{x}$ ← make x
                       the subject

$yx = x+1,$ $yx - x = 1$

$x(y-1) = 1,$ $x = \dfrac{1}{y-1}$

Swap x, y

$y = \dfrac{1}{x-1}$ → $g^{-1}(x) = \dfrac{1}{x-1}$

$g^{-1}(x) = \dfrac{1}{x(-)}$

(3)

(Total for Question is 7 marks)