Gold Level

Model Answers 7

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Difficulty Level	Gold
Booklet	Model Answers 7

Time Allowed: 59 minutes

Score: / 49

Percentage: /100

1

D →——————→ E

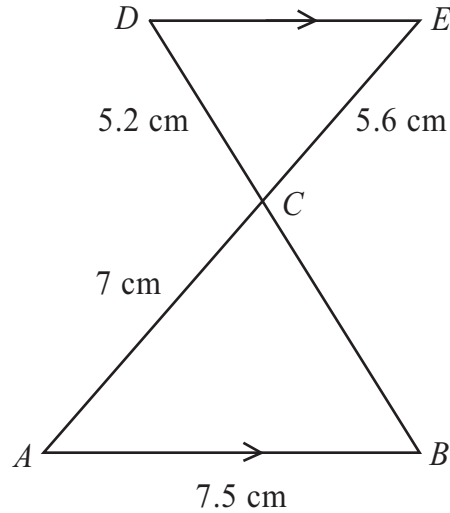5.2 cm   5.6 cm

C

7 cm

A →——————→ B

7.5 cm

Diagram **NOT**
accurately drawn

AB is parallel to *DE*.
The lines *AE* and *BD* intersect at *C*.
AB = 7.5 cm, *AC* = 7 cm, *CD* = 5.2 cm, *CE* = 5.6 cm.

(a) Calculate the length of *BC*.

Similar triangles

$$\frac{BC}{5.2} = \frac{7}{5.6} \qquad BC = 6.5$$

.... cm

(2)

(b) Calculate the length of *DE*.

$$\frac{DE}{7.5} = \frac{56}{7}$$

$$DE = 6$$

.... cm

(2)

(c) The area of triangle *ABC* is 21 cm²
    Calculate the area of triangle *EDC*.

$$SF = \frac{7}{5.6} = \frac{4}{5}$$

$$21 \times \frac{16}{25} = EDC$$

$$SF_{Area} = (SF)^2 = \frac{16}{25}$$

$$EDC = 13.44$$

13.44 cm²

(3)

(Total for Question is 7 marks)

2 $(3 + \sqrt{a})(4 + \sqrt{a}) = 17 + k\sqrt{a}$ where a and k are positive integers.

Find the value of a and the value of k.

$$(3 + \sqrt{a})(4 + \sqrt{a}) = 17 + k\sqrt{a}$$

$$12 + 4\sqrt{a} + 3\sqrt{a} + a$$

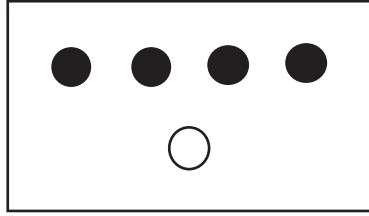$$12 + 7\sqrt{a} + a = 17 + k\sqrt{a}$$

$$\therefore a = 5$$

$$k = 7$$

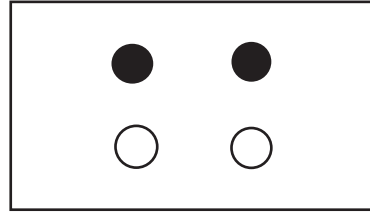a =................................

k =................................

(Total for Question is 3 marks)

3

Box X   Box Y

In Box X, there are 4 black discs and 1 white disc.
In Box Y, there are 2 black discs and 2 white discs.

Vikram takes at random a disc from Box X and puts it in Box Y.
He then takes at random a disc from Box Y.

(a) Calculate the probability that the disc he takes from Box X and the disc he takes
from Box Y will both be black discs.

$$\frac{4}{5} \times \frac{3}{5} \quad = \frac{12}{25}$$

$\frac{12}{25}$

(2)

(b) Calculate the probability that the disc he takes from Box Y will be a white disc.

$$\frac{4}{5} \times \frac{2}{5} + \quad \frac{1}{5} \times \frac{3}{5} = 0.32 + 0.12$$

$$= \frac{11}{25}$$

$\frac{11}{25}$

(3)

(Total for Question is 5 marks)

4 When a photograph is taken, the exposure time, t, is directly proportional to the square of the size, f, of the opening in the camera lens.

$t = 0.02$ when $f = 8$

(a) Find a formula for t in terms of f.

$$t \propto f^2 \Rightarrow \frac{t}{f^2} = k = \frac{0.02}{64}$$

$$t = kf^2$$

$$t = \frac{1}{3200} f^2$$

....

(3)

(b) Calculate the value of f when $t = 0.0098$

$$\sqrt{(0.0098)(3200)} = f$$
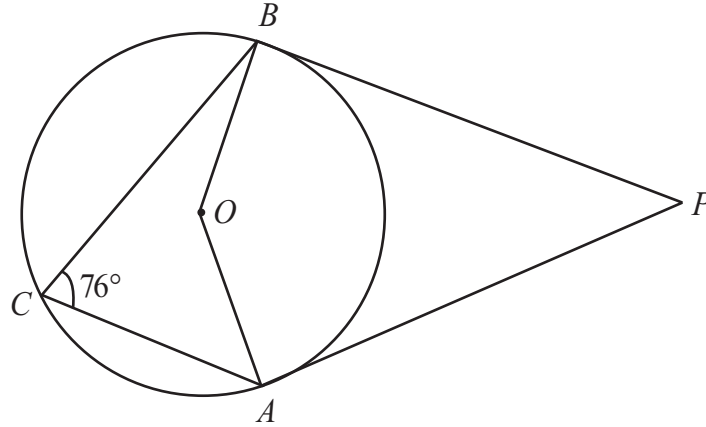
$$= \frac{28}{5}$$

$$=$$

$f = \dfrac{28}{5}$

(2)

(Total for Question is 5 marks)

5

Diagram **NOT** accurately drawn

A, B and *C* are points on a circle, centre *O*.
Angle *ACB* = 76°
PA and *PB* are tangents to the circle.

Calculate the size of angle *APB*.

$$BCA = \frac{1}{2} BOA \therefore BOA = 152°$$

$$OBP, OAP = 90°$$

$$360 - 180 - 152 - APB = 0$$
$$\therefore APB = 28°$$

_____28°_____ °

(Total for Question is 4 marks)

6 f is a function such that

$$f(x) = \frac{1}{x^2 + 1}$$

(a) Find $f(\frac{1}{2})$

$$f\left(\frac{1}{2}\right) = \frac{1}{\left(\frac{1}{2}\right)^2 + 1} = \frac{4}{5}$$

$$\frac{4/5}{\qquad\qquad}$$

(1)

g is a function such that

$$g(x) = \sqrt{x-1} \quad x \geqslant 1$$

(b) Find fg(x)

Give your answer as simply as possible.

$$f(g(x)) = \frac{1}{(\sqrt{x-1})^2 + 1} = \frac{1}{x-1+1} = \frac{1}{x}$$

$$fg(x) = \frac{1/x}{\qquad\qquad}$$

(2)

(Total for Question is 3 marks)

7 On Monday, Nalim made a journey.
On Tuesday, she made the same journey.
Her average speed on Tuesday was 25% greater than her average speed on Monday.

Calculate the percentage reduction in the time her journey took on Tuesday compared with Monday.

$$V_m \times 1.25 = V_T$$

$$\frac{t_m}{1.25} = t_T$$

D constant $\therefore t \propto \dfrac{1}{V}$

$$\therefore \quad \frac{1}{1.25} = 0.8$$

$$\therefore \quad 80\% \text{ multiplier}$$

$$\therefore \quad 20\% \underline{\text{reduction}}$$

.............................20............................. %

(Total for Question is 3 marks)

8

A

16.5 m

Diagram **NOT** accurately drawn

D

10°

59°

B

C

x
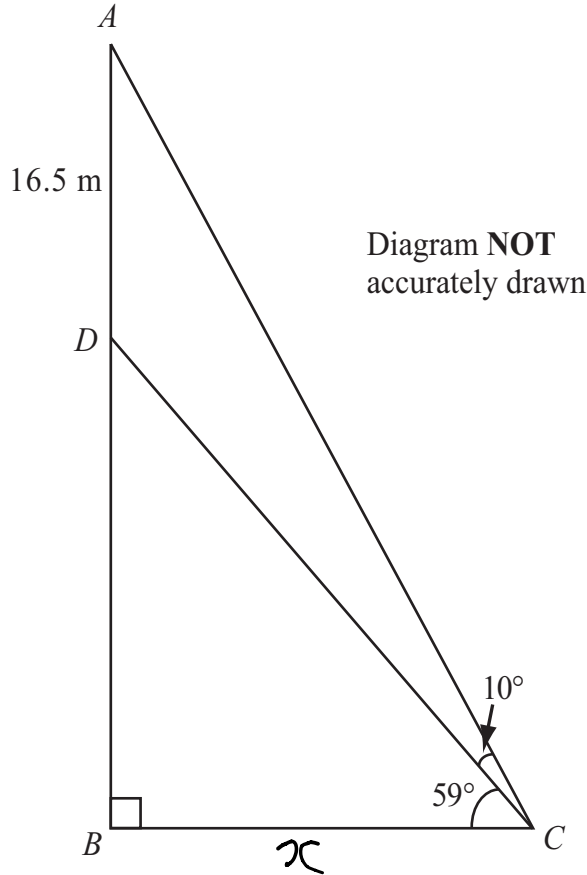
The diagram shows a vertical flagpole in Chennai, India.
The point *A* is at the top of the flagpole.
The point *B* is at the foot of the flagpole.
There is a platform at the point *D* on the flagpole.
B and *C* are points on horizontal ground.
AD = 16.5 m
The angle of elevation of *A* from *C* is 69°
The angle of elevation of *D* from *C* is 59°

Calculate the height, *AB*, of the flagpole.
Give your answer correct to 3 significant figures.

$$AB = 16.5 + DB$$

$$AB = x (\tan(10+59))$$

$$DB = x (\tan(59))$$

$$16.5 + DB = x (\tan(69))$$

$$BD + 16.5 = \frac{\tan(69)}{\tan(59)} (BD)$$

$$S^O_H \quad C^a_H T^O_A$$

$$\left(\frac{\tan(69)}{\tan(59)} - 1 \right) BD = 16.5$$

$$0.565... \quad BD = 16.5$$

$$\therefore \quad BD = \frac{16.5}{0.5652...}$$

$$BD \approx 29.189$$

$$AB \approx 45.7$$

9 Solve the simultaneous equations

$$y = 3x + 2 \quad \text{①}$$
$$x^2 + y^2 = 20 \quad \text{②}$$

Show clear algebraic working.

Sub ① into ②

$x^2 + (3x+2)^2 = 20$

$x^2 + (3x+2)(3x+2) = 20$

$x^2 + 9x^2 + 12x + 4 = 20$

$10x^2 + 12x - 16 = 0$

$5x^2 + 6x - 8 = 0$
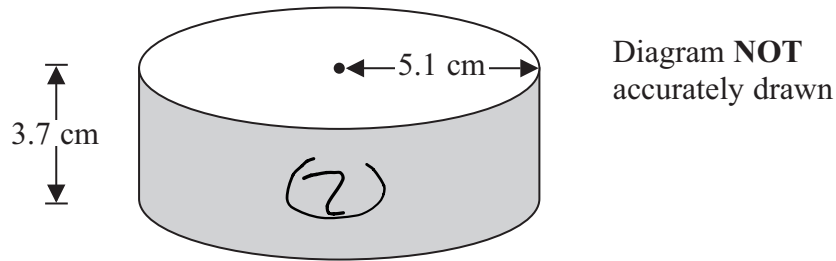
$(5x - 4)(x + 2) = 0$

$\therefore x = \dfrac{4}{5}, -2$

Sub x into ①

$\left(\dfrac{4}{5}, \dfrac{22}{5}\right), \ (-2, -4)$

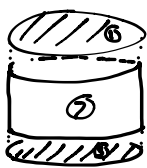$\left(\dfrac{4}{5}, 4\dfrac{2}{5}\right), \ (-2, -4)$

(Total for Question is 6 marks)

10

5.1 cm

3.7 cm

Diagram **NOT** accurately drawn

A solid cylinder has a radius of 5.1 cm and a height of 3.7 cm.

Work out the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

$$① = \pi r^2$$

$$① + ⑤ = 2\pi r^2 = 2\pi (5.1)^2$$

$$② = (2\pi r) \times h = 2\pi (5.1)(3.7)$$

$$(①+⑤) + ② = 163.47.. + 118.56..$$

or $\frac{2601}{50}\pi + \frac{1887}{50}\pi$

282 (3sf) .... cm^2

(Total for Question is 3 marks)

11 The number of runners in the London Marathon on 25th April, 2010 was 37 527.

Work out an estimate for the number of these runners whose birthday was on that day.

365 = Number of days in a year

$$\frac{\text{Number of runners}}{\text{Number of days in a year}} \approx \text{Number of runners with a birthday on a given day}$$

.

Round to 2 significant figures

$$\frac{38000}{350} = 1085.$$

$$\approx 110$$

110

(Total for Question is 4 marks)