Answers to Grade Grabber 7

Answer 1

(i) Each has angles of 44°, 68° and 68°

[1 mark]

(ii)

$$\frac{X}{\sin 44} = \frac{12}{\sin 68}$$

$$X = \frac{12 \sin 44}{\sin 68}$$

$$= 8.99 \text{ cm}$$

As we're told X is an integer, $X = 9$ cm

[2 marks]

(iii)

$$\frac{Y}{12} = \frac{15}{9}$$

$$Y = \frac{15 \times 12}{9}$$

$$= 20 \text{ cm}$$

[2 marks]

Answer 2

(i) $a = \frac{1}{2} \times 86 \Rightarrow a = 43°$

[2 marks]

(ii) $b = \frac{180 - 86}{2} \Rightarrow b = 47°$

[2 marks]

(iii) $c = 90 - 47 \Rightarrow c = 43°$

[2 marks]

Note: The equivalence of angles a and c is The Alternate Segment Theorem

Answer 3

$$x^2 + x = 1 \Rightarrow x^2 + x - 1 = 0$$

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

$$= \frac{-1 \pm \sqrt{1^2 - 4 \times 1 \times (-1)}}{2 \times 1} \quad * \text{ Must have this line of working } *$$

$$= 0.618 \text{ or } -1.618$$

[4 marks]

Answer 4

(a) **(i)** 21, 24 are not coprime as they both divide by 3

(ii) 35, 50 are not coprime as they both divide by 5

(iii) 33, 77 are not coprime as they both divide by 11

(iv) 25, 27 are coprime (as they both only divide by 1)

(b) **(i)** $550 = 2 \times 5 \times 5 \times 11$

(ii) 441, 550 are coprime

[4, 2 marks]

Answer 5

$$y = \frac{7 - 3x}{x + 5}$$

$$y(x + 5) = 7 - 3x$$

$$xy + 5y = 7 - 3x$$

$$xy + 3x = 7 - 5y$$

$$x(y + 3) = 7 - 5y$$

$$x = \frac{7 - 5y}{y + 3}$$

[4 marks]

Answer 6

(i)

$$\frac{3}{(x + 3)} + \frac{2}{(x + 7)} = 1$$

Multiply through by $(x + 3)(x + 7)$

$$3(x + 7) + 2(x + 3) = (x + 3)(x + 7)$$

$$3x + 21 + 2x + 6 = x^2 + 3x + 7x + 21$$

$$x^2 + 10x + 21 - 5x - 27 = 0$$

$$x^2 + 5x - 6 = 0 \qquad \square$$

[4 marks]

(ii)

$$(x + 6)(x - 1) = 0$$

$$\therefore \; x = -6 \quad \text{or} \quad x = 1$$

[2 marks]

Answer 7

Let $x = 0.\dot{7}\dot{7}2 \Rightarrow 10000x = 7727.2727272 \ldots$

Subtract $100x = 77.2727272 \ldots$

$$9900x = 7650$$

$$x = \frac{7650}{9900} \Rightarrow x = \frac{17}{22} \qquad \square$$

[2 marks]

Answer 8

(i) Using Pythagoras' Theorem, as instructed,

$$|AX| = \sqrt{24^2 + 10^2}$$
$$= 26 \text{ cm}$$

[1 mark]

(ii) The length of the arc $X_1 X_2$ is the circumference of the circular cone's base

$$C = 2\pi r$$
$$= 2 \times \pi \times 10$$
$$= 62.83 \text{ cm}$$

[2 marks]

(iii) Working out the circumference of the "opened up" circle of which the sector is a part,

$$C = 2\pi r$$
$$= 2 \times \pi \times 26 \qquad \text{from part (i)}$$
$$= 163.36 \text{ cm}$$
$$\theta = \frac{62.83}{163.36} \times 360$$
$$= 138.5°$$

[2 marks]

(iv)
$$Area = \frac{138.5}{360} \pi \times 26^2$$
$$= 817 \text{ cm}^2$$

[2 marks]