

Answers to Grade Grabber 10

Answer 1

Using the “FACT” button on a calculator,

$$63 = 3 \times 3 \times 7$$

$$105 = 3 \times 5 \times 7$$

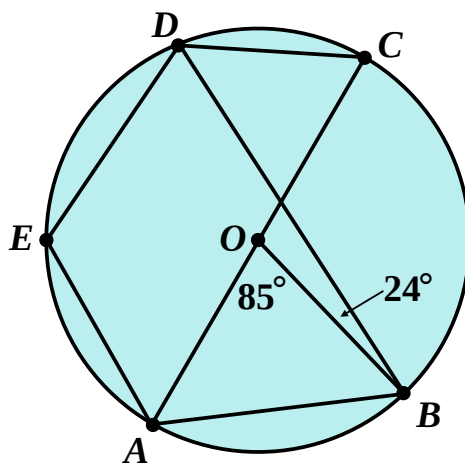
(i) $hcf\{65, 105\} = 21$

[1 mark]

(ii) $lcm\{65, 105\} = \frac{63 \times 105}{hcf\{65, 105\}}$
 $= 315$

[1 mark]

Answer 2



(i) $\angle OAB = \frac{180 - 85}{2}$ as $\triangle OAB$ is isosceles
 $= 47.5^\circ$

[2 marks]

(ii) $\angle BDC = \angle CAB$ both angles subtend arc CB
 $= \angle OAB$
 $= 47.5^\circ$

[2 marks]

(iii) $\angle OCD = \angle ACD$
 $= \angle ABD$ both angles subtend arc AD
 $= 24 + 47.5 = 71.5^\circ$

[2 marks]

(iv) $\angle AED = 180 - \angle ACD$ opposite angles in a cyclic quadrilateral
 $= 180 - 71.5 = 108.5^\circ$

[2 marks]

Answer 3

$$\begin{aligned}
 \text{(i)} \quad 8x + 13 &= 41 \\
 8x &= 28 \\
 x &= 3.5
 \end{aligned}$$

[1 mark]

$$\begin{aligned}
 \text{(ii)} \quad 4(5x - 7) &= 2(7x + 4) \\
 20x - 28 &= 14x + 8 \\
 6x &= 36 \\
 x &= 6
 \end{aligned}$$

[2 marks]

$$\begin{aligned}
 \text{(iii)} \quad x^2 - 11x + 24 &= 0 \\
 (x - 3)(x - 8) &= 0 \\
 \text{Either } x &= 3 \text{ or } x = 8
 \end{aligned}$$

[2 marks]**Answer 4**

$$\frac{108}{9} = 12$$

$\therefore$ The triangle has sides of length 24 cm 36 cm and 48 cm
 The largest angle, call it x , is opposite the longest side;

$$\begin{aligned}
 \cos x &= \frac{24^2 + 36^2 - 48^2}{2 \times 24 \times 36} \\
 &= -\frac{1}{4} \\
 x &= 104.5^\circ
 \end{aligned}$$

[4 marks]**Answer 5**

$$p(\text{heads}) = \frac{3}{4} \quad p(\text{tails}) = \frac{1}{4}$$

$$\begin{aligned}
 \text{(i)} \quad p(\text{heads, heads}) &= \frac{3}{4} \times \frac{3}{4} \\
 &= \frac{9}{16}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad p(\text{heads, tails}) + p(\text{tails, heads}) &= \frac{3}{4} \times \frac{1}{4} + \frac{1}{4} \times \frac{3}{4} \\
 &= \frac{6}{16} \quad \left(\frac{3}{8} \right)
 \end{aligned}$$

[2, 2 marks]

Answer 6

It may help to draw $\triangle AED$ separately to $\triangle ABC$

$$(a) \quad (i) \quad Isf = \frac{5}{3}$$

[1 mark]

$$(ii) \quad |BC| = 6 \times \frac{5}{3} \\ = 10 \text{ cm}$$

[1 mark]

$$(b) \quad Area \triangle AED = \left(\frac{3}{5}\right)^2 \times 20 \\ = 7.2 \text{ cm}^2$$

[3 marks]

Answer 7

$$\frac{5}{t-3} - \frac{2}{t+2} = 0$$

multiply through by $(t-3)(t+2)$

$$5(t+2) - 2(t-3) = 0$$

$$5t + 10 - 2t + 6 = 0$$

$$3t + 16 = 0$$

$$t = -\frac{16}{3}$$

[3 marks]

Answer 8

$$|AC| = \sqrt{7^2 + 4^2} = \sqrt{65} \quad (\text{About } 8.06 \text{ cm})$$

$$\angle HAC = \arctan\left(\frac{3}{\sqrt{65}}\right) = 20.4^\circ$$

[4 marks]

Answer 9

$$y = 4x^3 - 3x \Rightarrow \frac{dy}{dx} = 12x^2 - 3$$

$$\therefore \frac{dy}{dx} = 0 \text{ when } x = \pm \frac{1}{2}$$

$$\text{The gradient is negative for } -\frac{1}{2} < x < \frac{1}{2}$$

[4 marks]

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Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk