

Answers to Grade Gobbler 6

Answer 1

$$\begin{aligned}y &= 5x^3 + \frac{4}{x^2} \\&= 5x^3 + 4x^{-2} \\ \frac{dy}{dx} &= 15x^2 - 8x^{-3} \\&= 15x^2 - \frac{8}{x^3}\end{aligned}$$

[3 marks]

Answer 2

(i) $f(1) = 0$ by the factor theorem

$$1 + k + 3 - 10 = 0$$
$$\therefore k = 6$$

[1 mark]

(ii) $x^3 + 6x^2 + 3x - 10 = (x - 1)(x^2 + 7x + 10)$

$$= (x - 1)(x + 5)(x + 3)$$

[3 marks]

Answer 3

$$\begin{aligned}P(4 \text{ letter } t) &= {}^{10}C_4 \left(\frac{2}{9}\right)^4 \left(\frac{7}{9}\right)^6 \\&= 0.113371\end{aligned}$$

[4 marks]

Answer 4

$$\begin{aligned}\cos A &= \frac{4^2 + 7^2 - 10^2}{2 \times 4 \times 7} \\A &= \arccos(-0.625) \\A &= 128.7^\circ\end{aligned}$$

[3 marks]

Answer 5

$$\begin{aligned}\int_1^4 x^2 + 4 \, dx &= \left[\frac{x^3}{3} + 4x \right]_1^4 \\&= \frac{64}{3} + 16 - \frac{1}{3} - 4 \\&= 33\end{aligned}$$

[3 marks]

Answer 6

Add the two equations to get $2x^2 = 80 \Leftrightarrow x = \pm\sqrt{40}$

$$(\pm\sqrt{40}, \pm\sqrt{24}) \quad \text{or} \quad (\pm 2\sqrt{10}, \pm 2\sqrt{6})$$

$$\text{or } (\pm 6.32, \pm 4.90)$$

[4 marks]

Answer 7

$$2\cos^2 x - 3\sin x = 3$$

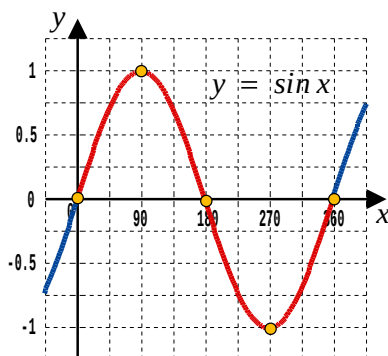
$$2(1 - \sin^2 x) - 3\sin x = 3 \quad \text{using } \cos^2 x + \sin^2 x = 1$$

$$2 - 2\sin^2 x - 3\sin x = 3$$

$$2\sin^2 x + 3\sin x + 1 = 0$$

$$(2\sin x + 1)(\sin x + 1) = 0$$

$$\text{Either } \sin x = -\frac{1}{2} \quad \text{or} \quad \sin x = -1$$



$$x_{WA} = 30^\circ$$

$$x = \{ 210^\circ, 270^\circ, 330^\circ \}$$

[6 marks]

Answer 8

$$f^{-1}(x) = \frac{3x - 5}{4}$$

[3 marks]

Answer 9**(a)**

$$s = ut + \frac{1}{2} a t^2$$

$$50 = 5 \times 4 + \frac{1}{2} \times a \times 4^2$$

$$a = 3.75 \text{ m s}^{-2}$$

[3 marks]**(b)**

$$v^2 = u^2 + 2as$$

$$30^2 = 5^2 + 2 \times 3.75 \times s$$

$$s = 116.67 \text{ metres}$$

[3 marks]**Answer 10**

$$\frac{dy}{dx} = 3x^2 \quad \text{so at } (\sqrt{2}, 2\sqrt{2}) \quad m = 6$$

$$y = mx + c \Rightarrow 2\sqrt{2} = 6\sqrt{2} + c \Rightarrow c = -4\sqrt{2}$$

$$y = 6x - 4\sqrt{2}$$