

Grade Gobbler 8

Answer 1

$$-13 \leq 5x + 7 \leq 42$$

$$-20 \leq 5x \leq 35$$

$$-4 \leq x \leq 7$$

[2 marks]

Answer 2

(i)
$$y = x^3 + 4x^{-2}$$
$$\frac{dy}{dx} = 3x^2 - 8x^{-3}$$
$$= 3x^2 - \frac{8}{x^3}$$

[2 marks]

(ii) When $x = 2$, $\frac{dy}{dx} = 11$

[2 marks]

(iii)
$$y = mx + c$$
$$9 = 11 \times 2 + c \quad \therefore c = -13$$
$$y = 11x - 13$$

[2 marks]

Answer 3

$$\begin{aligned} \int_3^7 \frac{48}{x^2} dx &= \int_3^7 48x^{-2} dx \\ &= \left[-48x^{-1} \right]_3^7 \\ &= \left[-\frac{48}{x} \right]_3^7 \\ &= \left[\left(-\frac{48}{7} \right) - \left(-\frac{48}{3} \right) \right] \\ &= \frac{64}{7} \quad \text{or} \quad 9.14 \end{aligned}$$

[4 marks]

Answer 4

$$\begin{aligned}
 \text{(i)} \quad \text{Midpoint} &= \left(\frac{-2 + 6}{2}, \frac{-3 + 9}{2} \right) \\
 &= (2, 3)
 \end{aligned}$$

[1 mark]

$$\begin{aligned}
 \text{(ii)} \quad m &= \frac{\Delta y}{\Delta x} \\
 &= \frac{9 - (-3)}{6 - (-2)} \\
 &= \frac{12}{8} \\
 &= \frac{3}{2}
 \end{aligned}$$

[1 mark]**(iii)** Perpendicular gradient: “sign changed reciprocal”

$$\text{i.e.} \quad -\frac{2}{3}$$

[1 mark]

$$\text{(iv)} \quad y = mx + c$$

$$3 = -\frac{2}{3} \times 2 + c \quad \therefore c = \frac{13}{3}$$

$$y = -\frac{2}{3}x + \frac{13}{3}$$

[2 marks]

$$\text{(v)} \quad \text{Radius} = \sqrt{(\Delta x)^2 + (\Delta y)^2} \quad \text{between } B \text{ and the midpoint}$$

$$= \sqrt{(6 - 2)^2 + (9 - 3)^2}$$

$$= \sqrt{16 + 36}$$

$$= \sqrt{52} \quad \text{or} \quad 2\sqrt{13} \quad \text{or} \quad 7.211$$

Equation of circle;

$$(x - 2)^2 + (y - 3)^2 = 52$$

[3 marks]**Answer 5**

$$\begin{aligned}
 P(7 \text{ heads}) &= {}^{12}C_7 (0.7)^7 (0.3)^5 \\
 &= 0.158496
 \end{aligned}$$

[4 marks]

Answer 6

You will get MO MARKS in this question if you use the “solve equation” on a calculator to get solutions without any working.

$$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times (-18)}}{2 \times 1}$$

$$x = \frac{-4 \pm \sqrt{88}}{2}$$

$$x = \frac{-4 \pm \sqrt{4 \times 22}}{2}$$

$$x = \frac{-4 \pm 2\sqrt{22}}{2}$$

$$x = \frac{2(-2 \pm \sqrt{22})}{2}$$

$$x = -2 \pm \sqrt{22}$$

[3 marks]

Answer 7

(i)

$$f(x) = 0 \Rightarrow x^2 - 11x + 30 = 0$$

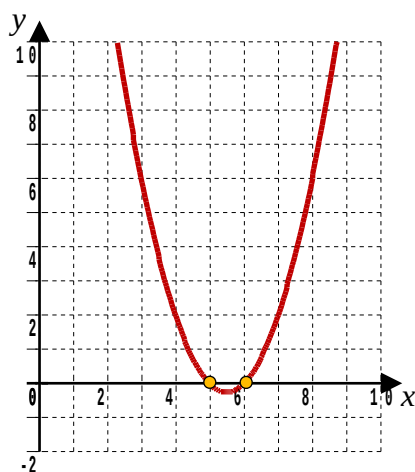
$$(x - 5)(x - 6) = 0$$

Either $(x - 5) = 0$ or $(x - 6) = 0$

$\therefore$ Crosses the x-axis at $(5, 0)$, $(6, 0)$

[2 marks]

(ii)



[2 marks]

(iii) $-5 \leq x \leq 6$

[2 marks]

(iv) $x < 5$ or $x > 6$

[2 marks]

Answer 8

$$(y + 3)^2 - (x + 5)^2 = 4$$

$$(2x + 5 + 3)^2 - (x + 5)^2 = 4$$

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

$$4x^2 + 32x + 64 - x^2 - 10x - 25 = 4$$

$$3x^2 + 22x + 35 = 0$$

$$(3x + 7)(x + 5) = 0$$

$$x = -\frac{7}{3} \quad \text{or} \quad -5$$

$$\left(-\frac{7}{3}, \frac{1}{3}\right) \quad \text{or} \quad (-5, -5)$$

[5 marks]