

$$V = \pi r^2 h \quad A =$$

$$1000 = \pi r^2 h$$

$$h = \frac{1000}{\pi r^2}$$

Let r = the radius

$$A = 2\pi r^2 + 2\pi r h$$

Express with a single variable

$$2\pi r^2 + 2\pi r \left[\frac{1000}{\pi r^2} \right]$$

$$A = 2\pi r^2 + 2000r^{-1}$$

$$A' = 4\pi r - \frac{2000}{r^2}$$

$$\frac{2000}{r^2} = 4\pi r$$

$$4\pi r^3 = 2000$$

$$r^3 = \frac{500}{\pi}$$

$$r = \sqrt[3]{\frac{500}{\pi}} \approx 5.41 \text{ cm}$$

$$\textcircled{1} \text{ c) } y = x^5 + 8x^3 + x$$

$$y' = 5x^4 + 24x^2 + 1$$

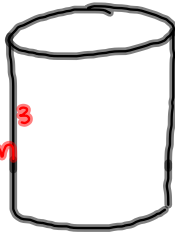
increasing on $(-\infty, \infty)$

← y' is always positive.

The function is always increasing

②

$$V = 1000 \text{ cm}^3$$



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$$1000 = \pi r^2 h$$

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Let $r =$ radius

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Express with a single variable

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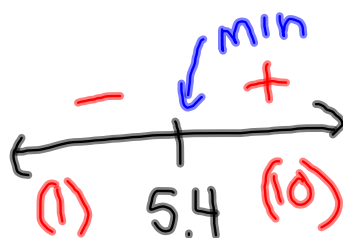
$$A' = 4\pi r - \frac{2000}{r^2}$$

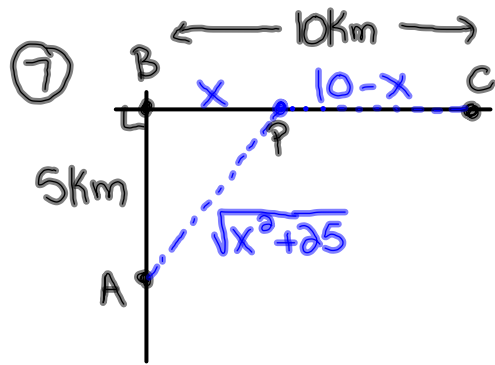
$$\frac{2000}{r^2} = 4\pi r$$

$$4\pi r^3 = 2000$$

$$r^3 = \frac{500}{\pi}$$

$$r = \sqrt[3]{\frac{500}{\pi}} \approx 5.4 \text{ cm}$$





Let x = the distance from B to P

$$T = \frac{d}{s}$$

$$T = \frac{\sqrt{x^2 + 25}}{3} + \frac{10 - x}{5}$$

$$T = \frac{1}{3}(x^2 + 25)^{1/2} + \frac{10}{5} - \frac{1}{5}x$$

$$T' = \frac{1}{3} \cdot \frac{1}{2}(x^2 + 25)^{-1/2} (2x) - \frac{1}{5}$$

or

$$T' = \frac{5x - 3\sqrt{x^2 + 25}}{15\sqrt{x^2 + 25}}$$

denominator always +

$$T' = \frac{x}{3(x^2 + 25)^{1/2}} - \frac{1}{5}$$

$$\frac{1}{5} = \frac{x}{3\sqrt{x^2 + 25}}$$

$$(5x)^2 = (3\sqrt{x^2 + 25})^2$$

square both sides

$$25x^2 = 9(x^2 + 25)$$

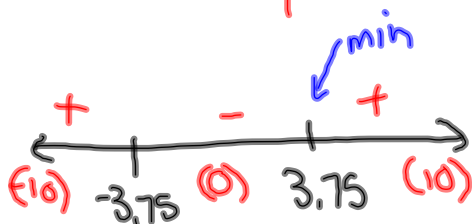
$$25x^2 = 9x^2 + 225$$

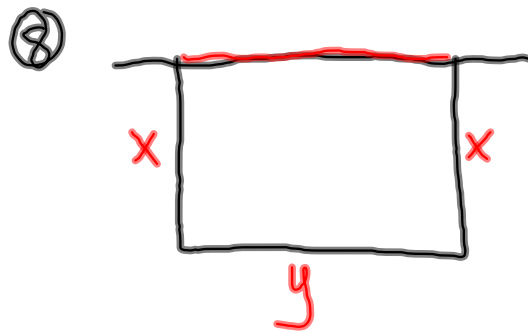
$$16x^2 = 225$$

$$x^2 = \frac{225}{16}$$

$$x = \pm \frac{15}{4} = \pm 3.75$$

∴ You should head to a point 3.75km east of B.





$$P = 2x + y$$

$$500 = 2x + y$$

$$500 - 2x = y$$

$$500 - 2(125) = y$$

$$500 - 250 = y$$

$$250\text{m} = y$$

$$\therefore 125\text{m} \times 250\text{m}$$

$$A = xy$$

Express as a single variable

$$A = x(500 - 2x)$$

$$A = 500x - 2x^2$$

$$A' = 500 - 4x$$

$$4x = 500$$

$$x = 125\text{m}$$

+	↓ max	-
————— —————		
(1)	125	(200)