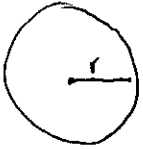


11. (D)



$$\textcircled{R} \quad \frac{dA}{dt} = ?$$

$$r = 8 \text{ cm}$$

$$r = 32 \text{ cm}$$

$$\frac{dr}{dt} = 4 \text{ cm/min}$$

$$\textcircled{E} \quad A = \pi \cdot r^2$$

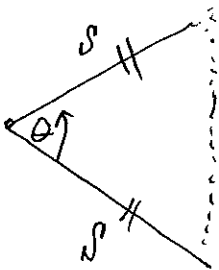
$$\textcircled{D} \quad \frac{dA}{dt} = 2 \cdot \pi \cdot r \cdot \frac{dr}{dt}$$

? ✓ ✓

$$\text{a.) } \textcircled{S} \quad \frac{dA}{dt} = 2 \cdot \pi \cdot 8 \cdot 4 = \underline{64\pi \text{ cm}^2/\text{min}}$$

$$\text{b.) } \frac{dA}{dt} = 2\pi \cdot 32 \cdot 4 = 256\pi \text{ cm}^2/\text{min}$$

12.



(D)

$$\textcircled{R} \quad \frac{d\theta}{dt} = \frac{1}{2}$$

$$\frac{dA}{dt} = ?$$

$$\theta = \pi/6, \pi/3$$

$$\textcircled{E} \quad A = \frac{1}{2}s^2 \cdot \sin\theta$$

constant, not variable

$$\textcircled{D} \quad \frac{dA}{dt} = \frac{1}{2}s^2 \cdot \cos\theta \cdot \frac{d\theta}{dt}$$

? ✓ ✓

$$\pi/6: \textcircled{E} \quad \frac{dA}{dt} = \frac{1}{2} \cdot s^2 \cdot \cos\left(\frac{\pi}{6}\right) \cdot \frac{1}{2}$$

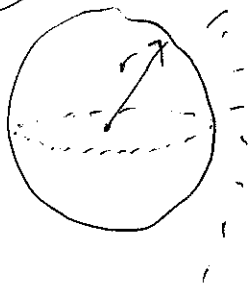
$$\frac{1}{4}s^2 \cdot \frac{\sqrt{3}}{2} \Rightarrow \underline{\frac{\sqrt{3}}{8}s^2 \text{ units}^2/\text{min}}$$

$$\pi/3: \quad \frac{dA}{dt} = \frac{1}{2} \cdot s^2 \cdot \cos\left(\frac{\pi}{3}\right) \cdot \frac{1}{2}$$

$$\frac{1}{4}s^2 \cdot \frac{1}{2} \Rightarrow \underline{\frac{1}{8}s^2 \text{ units}^2/\text{min}}$$

13.

(D)



(R)

$$\frac{dr}{dt} = 3 \text{ in}/\text{min}$$

$$\frac{dV}{dt} = ?$$

$$r = 9, 36$$

(E)

$$V = \frac{4}{3} \pi r^3$$

(D)

$$\frac{dV}{dt} = 4\pi r^2 \cdot \frac{dr}{dt}$$

?

✓ ✓

$$r=9$$

$$\frac{dV}{dt} = 4\pi \cdot 9^2 \cdot 3$$

$$= \underline{972\pi \text{ in}^3/\text{min}}$$

$$r=36$$

$$\frac{dV}{dt} = 4 \cdot \pi \cdot 36^2 \cdot 3$$

$$= 15,552\pi \text{ in}^3/\text{min}$$

b.)

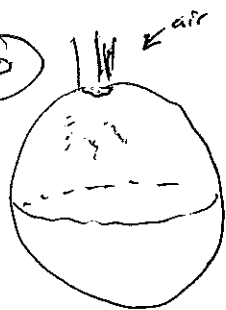
$$\frac{dV}{dt} = 4\pi r^2 \cdot \frac{dr}{dt}$$

← constant.

not linear;
quadratic

14.

(D)



(R)

$$\frac{dV}{dt} = 800 \text{ cc}/\text{min}$$

$$\frac{dr}{dt} = ?$$

$$r = 30, 60?$$

(E)

$$V = \frac{4}{3} \pi r^3$$

(D)

$$\frac{dV}{dt} = 4\pi r^2 \cdot \frac{dr}{dt}$$

✓

✓

?

(S)

a.)

$$r=30:$$

$$800 = 4\pi \cdot 30^2 \cdot \frac{dr}{dt}$$

$$\frac{800}{3600\pi} = \frac{3600\pi \frac{dr}{dt}}{3600\pi}$$

$$\boxed{\frac{2}{9\pi} \text{ cm}/\text{min} \cdot \frac{dr}{dt}}$$

b.) $r=60$

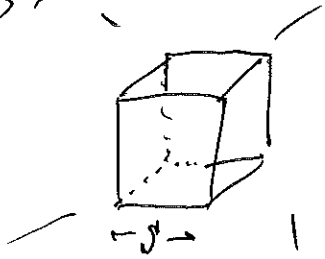
$$800 = 4\pi \cdot 60^2 \cdot \frac{dr}{dt}$$

$$800 = 14400\pi \cdot \frac{dr}{dt}$$

$$\frac{800}{14400\pi} \cdot \frac{dr}{dt}$$

$$\boxed{\frac{1}{18\pi} \text{ cm}/\text{min}}$$

15. (D)



(R)

$$\frac{ds}{dt} = 6 \text{ cm/min}$$

$$\frac{dV}{dt} = ?$$

$$s = 2,10$$

(E)

$$V = s^3$$

(D)

$$\frac{dV}{dt} = 3s^2 \cdot \frac{ds}{dt}$$

? ✓ ✓

(F)

$$a) \frac{dV}{dt} = 3 \cdot 2^2 \cdot 6$$

$$\underline{72 \text{ cm}^3/\text{min}}$$

b.)

$$\frac{dV}{dt} = 3 \cdot 10^2 \cdot 6$$

$$\underline{1800 \text{ cm}^2/\text{min}}$$