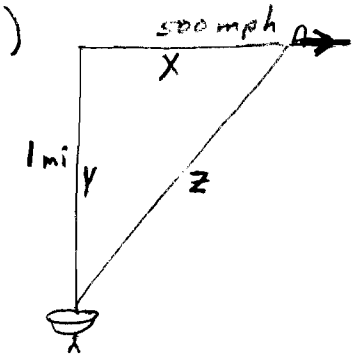
3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

1) $V = x^3$

$$\frac{dV}{dt} = 3x^2 \frac{dx}{dt}$$

11)



Known: $\frac{dx}{dt} = 500$ mph $\quad \frac{dy}{dt} = 0$

$y = 1$ mi

Find: $\frac{dz}{dt}$ when $z = 2$ mi

$$x^2 + y^2 = z^2$$

$$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 2z\frac{dz}{dt}$$

$$\frac{dz}{dt} = \frac{1}{z}\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right)$$

$z^2 = x^2 + 1^2$

$4 = x^2 + 1$

$x^2 = 3$

$x = \sqrt{3}$

$$\frac{dz}{dt} = \frac{1}{2}\sqrt{3}\left(500 + 1(0)\right)$$

$$\frac{dz}{dt} = 250\sqrt{3}$$

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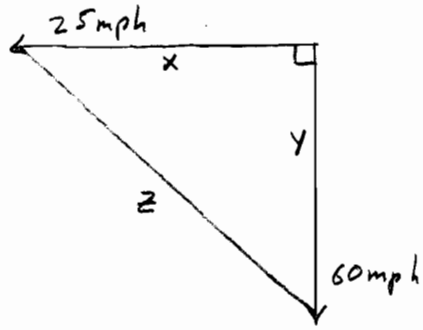
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

15)



Known: $\frac{dx}{dt} = 25\text{mph}$

$\frac{dy}{dt} = 60\text{mph}$

Find: $\frac{dz}{dt}$ when $t = 2$

$z^2 = x^2 + y^2$

$2z\frac{dz}{dt} = 2x\frac{dx}{dt} + 2y\frac{dy}{dt}$

$\frac{dz}{dt} = \frac{1}{z}\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right)$

when $t = 2$, $x = 25 \cdot 2 = 50$
$y = 60 \cdot 2 = 120$

$\therefore z = \sqrt{50^2 + 120^2}$

$= 130$

$\frac{dz}{dt} = \frac{1}{130}(50 \cdot 25 + 120 \cdot 60)$

$= \frac{1}{130}(1250 + 7200)$

$\boxed{\frac{dz}{dt} = 65\text{ mph}}$

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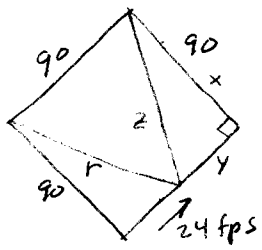
COMET

18)



a) Known: $\frac{dy}{dt} = -24$ fps $\quad \frac{dx}{dt} = \emptyset$

Find: $\frac{dz}{dt}$ when $y = 45$ ft

$$z^2 = x^2 + y^2$$

$$\frac{dz}{dt} = \frac{1}{z}\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right)$$

when $y = 45$ $\quad z = \sqrt{90^2 + 45^2}$

$$= \sqrt{10125}$$

$$z = 100.62$$

$$\frac{dz}{dt} = \frac{1}{100.62}\left(90 \cdot 0 + 45(-24)\right)$$

$$\boxed{\frac{dz}{dt} = -10.73 \text{ fps}}$$

b) Find $\frac{dr}{dt}$ when $y = 45$ ft

$\frac{dy}{dt} = 24$ fps (positive) $\quad r = 100.62$

$$\frac{dr}{dt} = \frac{1}{r}\left(x\frac{dx}{dt} + y\frac{dy}{dt}\right)$$

$$= \frac{1}{100.62}\left(90 \cdot 0 + 45(24)\right)$$

$$\boxed{\frac{dr}{dt} = 10.73 \text{ fps}}$$