a

**11.** What is the length of the hypotenuse of a right triangle when the other two sides have length 3 and 4 ?

A = 3 B = 4 C = 6 D = 25 E = none of these

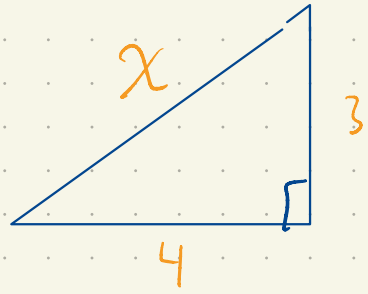
**12.** Now lengths are 2 and 3 . What's the hypotenuse?

A = $\sqrt{5}$ B = $\sqrt{13}$ C = 13 D = 5

**13.** Lengths 3 x and 4x . What's the hypotenuse?

A = 5 + x B = 5 x 2 C = 25 x D = 5x

(11)




$a^2 + b^2 = c^2$

$3^2 + 4^2 = x^2$

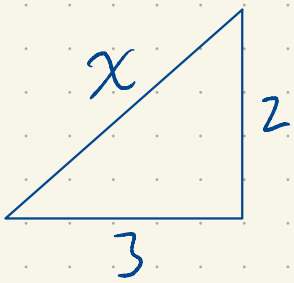
$9 + 16 = x^2$

$25 = x^2$

$\sqrt{25} = \sqrt{x^2}$

$5 = x$

(12)




$2^2 + 3^2 = x^2$

$4 + 9 = x^2$

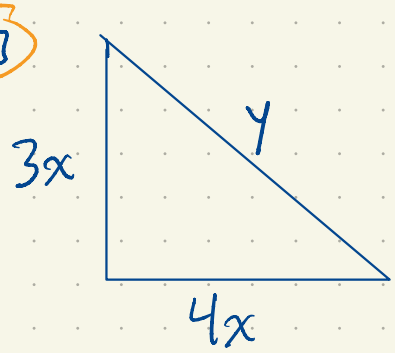
$13 = x^2$

$\sqrt{13} = x$

$\approx 3.5$

favorites

(13)




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

$9x^2 + 16x^2 = y^2$

$25x^2 = y^2$

$\sqrt{25x^2} = y$

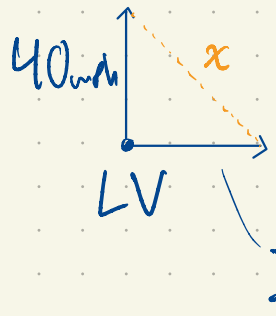
$\sqrt{25}\sqrt{x^2} = y$

$\boxed{5x = y}$

**14.** You and Marie are in Vegas. You drive north at 40 mph and Marie drives east at 30 mph. How far apart are you after 1 hour? Click A when you have the answer.

**15.** How many miles apart are you after t hours?

A = 50t  B = 50 + t  C = 50 $t^2$  D = 2500$t^2$




$x^2 = 40^2 + 30^2$

$x^2 = 1600 + 900$

$x^2 = 2500$

$x = \sqrt{2500} = \sqrt{25}\sqrt{100} = (5)(10)$

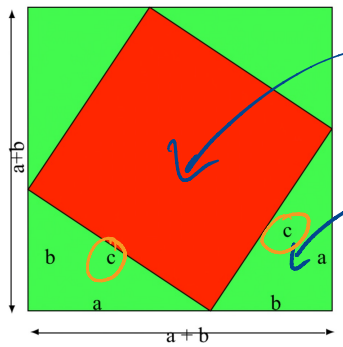
$= \boxed{50}$

Note:

$\sqrt{1600 + 900} \neq \sqrt{1600} + \sqrt{900}$

$\sqrt{1600 \times 900} = \sqrt{1600}\sqrt{900}$

## Why Pythagorean Theorem works




$a^2+b^2=c^2$

$\frac{1}{2}ab$

$A=(a+b)^2=a^2+b^2+2ab$

$4\left(\frac{1}{2}ab\right)$

2. A rectangular parking lot is to be made in the shape of a rectangle. It will have an area of 2000 square meters. Express the length of the parking lot in terms of the W = width .

A = (2000 − 2 W ) / 2  B = 2000 / W  C = 2000 − W

D = Other

3. The parking lot will be surrounded by a fence. Express the total length of the fence in terms of W .

A = 2000 + 2 W  B = L + W  C = $4000W^{-1} + 2W$

4. The fence costs $7 per meter. Express the total cost of all the fence in terms of W .

A = 7 × 2000  B = $7 \times 4000W^{-1} + 2W$

C = 28000 $W^{-1}$ + 14 W

(2)


$A=2{,}000\,m$

$A=LW$

$2000=LW$

$L=\frac{2000}{W}$

(3) $P=2L+2W$

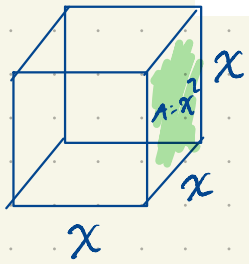
$=2\left(\frac{2000}{W}\right)+2W$

$=\frac{4000}{W}+2W$

(4) cost = $7/meter

3.2.41 Express the total surface area of a cube in terms of its volume $V$.

Draw a picture! Name the unknowns!




$SA = 6x^2$

$V = x \cdot x \cdot x = x^3$

use this to sub. for $x$

$V = x^3$

$\sqrt[3]{V} = x$

Sub

$SA = 6\left(\sqrt[3]{V}\right)^2$

$= 6\left(V^{1/3}\right)^2$

$\boxed{SA = 6V^{2/3}}$

8. An oil leak!

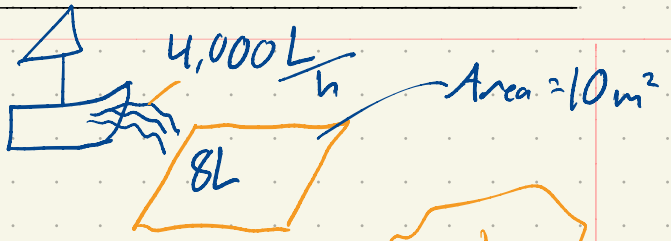
- Oil is leaking from an oil tanker at the rate of 4000 liters per hour.
- 8 liters of oil spread out over 10 square meters of ocean surface.
- A SQUARE oil slick forms.

- Express the length, X , of one side of the square oil slick as a function of the time t (in hours) the tank has been leaking.
- After how many hours will the oil slick be a square with side length 2 kilometers?

PLAN:

(i) How many liters of oil on ocean after t hours?

(ii) How much area does this oil cover?

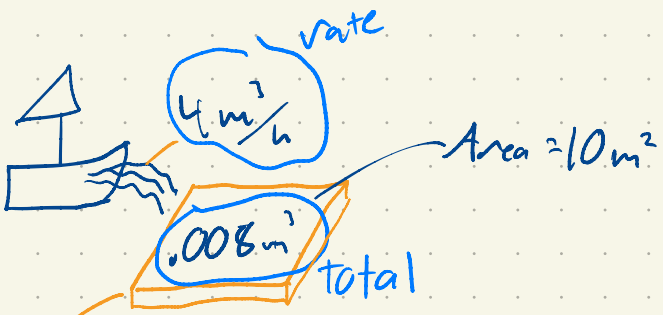



$1m^3 = 1000\,L$

$= 1$

$$\frac{4{,}000\,L}{h} \cdot \frac{1\,m^3}{1000\,L} = \frac{4\,m^3}{h}$$

$$8L \cdot \frac{1\,m^3}{1000L} = .008\,m^3$$




Total ($m^3$) ÷ rate ($m^3/h$) = time (h)

$$.008\,m^3 \cdot \frac{1\,h}{4\,m^3} = \frac{.008}{4}\,h = .002h = \text{time}$$

height: $.008\,m^3 \cdot \frac{1}{10\,m^2} = .0008\,m$ = thickness

$$\text{Area} = \frac{4(t)\,m^3}{.0008\,m}$$

$$\text{Side} = \sqrt{A_{m^2}} = \sqrt{\frac{4t}{.0008}}\,m$$

$$= \sqrt{\frac{t}{.0002}}\,m$$

# Office Hours

**Cooper 1.3.10**

$\left(\frac{x}{100} \cdot 9 + \frac{y}{100} \cdot 3\right)$

Express x% of 9 plus y% of 3 as a percentage of 11.

.109 %

**Online Math Lab resources for this problem:**

- Order of Operations
- Polynomials
- Percents
- Fractions
- Exponents

$\frac{9x}{100} + \frac{3y}{100}$

$= \frac{9x+3y}{100}$

5 as a % of 11?

↳ what fraction

$\frac{5}{11}$

↳ as a percent

mult. by 100%

$\frac{5}{11} \cdot 100\% = \frac{500}{11}\%$

$\frac{9x+3y}{100}$ as a % of 11?

↳ what fraction

$\frac{9x+3y}{100} \cdot \frac{1}{11} = \frac{9x+3y}{1100}$

↳ as a percent

$\frac{(9x+3y)}{1100} \cdot 100\%$

$\frac{(9x+3y)(\cancel{100})}{\cancel{1100}}\%$

$= \boxed{\frac{9x+3y}{11}\%}$

## HW01: Problem 11

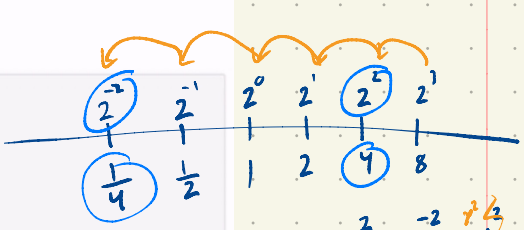
(1 point)

**Cooper 1.5.34**

Make the following substitutions for $x$ in the expression

$$\sqrt{x}+\frac{1}{x}+3x^2.$$

$(a)x=2 \quad (b)x=a \quad (c)x=c^2 \quad (d)x=a+b \quad (e)x=y+y^{-1}.$




$y^2+y^{-2}=y^2+\frac{1}{y^2}=\frac{y^4}{y^2}+\frac{1}{y^2}$

$y^1 \cdot y^{-1}=y^{1-1}=y^0=1$

$y\,y^{-1}=\frac{y}{1}\cdot\frac{1}{y}=\frac{y}{y}=1$

**(a)** $\sqrt{x}+\frac{1}{x}+3x^2$

$\sqrt{2}+\frac{1}{2}+3(2)^2$

$\sqrt{2}+\frac{1}{2}+12$

$\sqrt{2}+12.5$

sqrt(2)+12.5

**(b)** $\sqrt{x}+\frac{1}{x}+3x^2$

$\sqrt{a}+\frac{1}{a}+3a^2$

**(c)** $\sqrt{x}+\frac{1}{x}+3x^2$

$\sqrt{c^2}+\frac{1}{c^2}+3(c^2)^2$

$c+\frac{1}{c^2}+3c^4$

c+1/c^2+3c^4

c+c^(-2)+3c^4

$c^{-2}=\frac{1}{c^2}$

| | $y$ | $y^{-1}$ |
|---|---|---|
| $y$ | $y^2$ | 1 |
| $y^{-1}$ | 1 | $y^{-2}$ |

$=y^2+2+y^{-2}$

**(d)** $\sqrt{x}+\frac{1}{x}+3x^2$

$\sqrt{a+b}+\frac{1}{a+b}+3(a+b)^2$

First
Outside
Inside
Last

$(a+b)(a+b)$

$a^2+ab+ba+b^2$

$=3(a^2+2ab+b^2)$

$\sqrt{a+b}+\frac{1}{a+b}+3(a^2+2ab+b^2)$

not simpler

**(e)** $\sqrt{x}+\frac{1}{x}+3x^2$

$\sqrt{y+y^{-1}}+\frac{1}{y+y^{-1}}+3(y+y^{-1})^2$

$\frac{1}{ab^{-1}}=\frac{b}{a}$

$\frac{1}{a+b^{-1}}\neq\frac{b}{a}$

$(x^a)^b=x^{ab}$

$(x^{-1})^2=x^{-2}$

$\sqrt{y+y^{-1}}+\frac{1}{y+y^{-1}}+3(y+y^{-1})^2$