Workplace Math 11- Formulas

Fractions, Decimals, & Percents

Change a . . .	To a . . .	To a . . .
	Decimal	**Percent**
Fraction	**Divide the numerator by the denominator.** Example: ¾ would be $3 \div 4 = 0.75$	**Change the fraction to a decimal then multiply the decimal by 100.** Example: $\frac{3}{4} = 0.75$ Then $0.75 \times 100 = 75\%$

Change a . . .	To a . . .	To a . . .
	Percent	**Fraction**
Decimal	**Multiply the decimal by 100.** Example: To change 0.382 to a percent just multiply by 100. $0.382 \times 100 = 38.2\%$	**If you can read the decimal properly you can write it as a fraction. Simplify the fraction.** Example: 0.875 reads 875 thousandths – as a fraction that would be $\frac{875}{1000}$ which reads exactly the same. Now simplify your answer and you are finished $\frac{875}{1000} = \frac{7}{8}$.

Change a . . .	To a . . .	To a . . .
	Decimal	**Fraction**
Percent	**Divide the percent by 100.** Example: 75% would be $75 \div 100 = 0.75$ So 75% = 0.75	**Write the percent as a fraction over 100 then simplify the fraction.** Example: 75% would be $\frac{75}{100}$. Simplified $\frac{75}{100} = \frac{3}{4}$

Finding the Percent of a Number

To find the percent of a number – Multiply the number by the percent written as a decimal or a fraction.

Example: 75% of 40 . 75% = 0.75 so this would be

0.75 x 40 = 30 OR since 75% = $\frac{75}{100}$ = ¾ then ¾ x 40 = 30.

Finding the Fraction of a Number

Multiply the number by the fraction or if the fraction can be written as a terminating decimal then you can also multiply by the fraction written as a decimal.

Example: ¾ of 28 would be ¾ x 28 = 21   OR   0.75 x 28 = 21

Using Proportions: Always remember $\frac{part}{whole}$

Example: Alex budgeted $150.00 a month for transportation. This represents 8% of his monthly income. How much does he make per month?

Think- are we looking for a part of his income, or his whole income? Whole!

Step 1: Set up proportion where percentages are one fraction, income values are the other

part ⟶   8 / 100 = 150 / x ↗ part

whole ↗   ← whole

$$\frac{8}{100} = \frac{150}{x}$$

Step 2: Cross multiply and divide! (multiply diagonal terms, and divide by last term)

$100 \times 150 = 1500 \div 8 = \$1\ 875$ So his monthly budget is $1 875.

Example: Alex spends $300 a month on clothes. She earns $2500 per month. What percent of her monthly budget does she spent on clothes?

% ⟶ $\left[\frac{x}{100} = \frac{300}{2500}\right]$ ← monetary values

$100 \times 300 = 30\ 000 \div 2500 = 12\%$

SIMPLE INTEREST

I = Prt

I = Interest
P = Principal (amount of money originally borrowed or invested)
r = rate (interest rate, in decimal form)
t = time (in years)

> Ex. 2 years = 2
> 15 weeks = 15 ÷ 52
> 145 days = 145 ÷ 365
> 3 months = 3 ÷ 12

Other versions of this formula to use when finding rate, time, or principal:

r = I ÷ (P × t) × 100

t = I ÷ (P × r)

P = I ÷ (r × t)

COMPOUND INTEREST

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

A = final Amount (principal + interest)
P = Principal (amount of money originally borrowed or invested)
r = rate (interest rate, in decimal form)
t = time (in years)
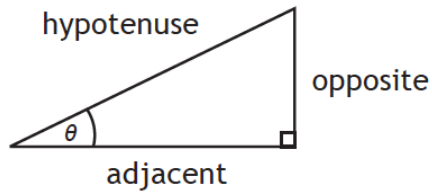n = number of times interest is compounded per year

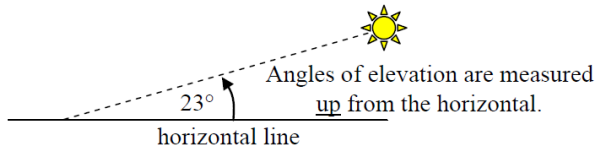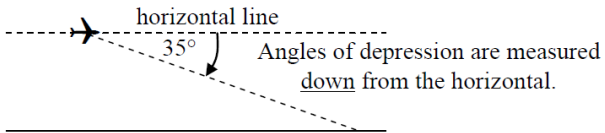| Values of n	
Annually = 1	Monthly = 12
Semi-annually = 2	Weekly = 52
Quarterly = 4	Daily = 365

Trigonometry

Pythagorean Theorem: $a^2 + b^2 = c^2$ *(right triangles only)*
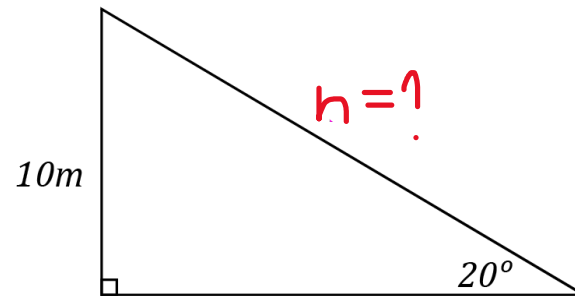
Trigonometric Ratios:

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

hypotenuse

opposite

adjacent

θ

23°
horizontal line

Angles of elevation are measured <u>up</u> from the horizontal.

SOH CAH TOA!

horizontal line
35°

Angles of depression are measured <u>down</u> from the horizontal.

Example:

h = ?

10m

20°

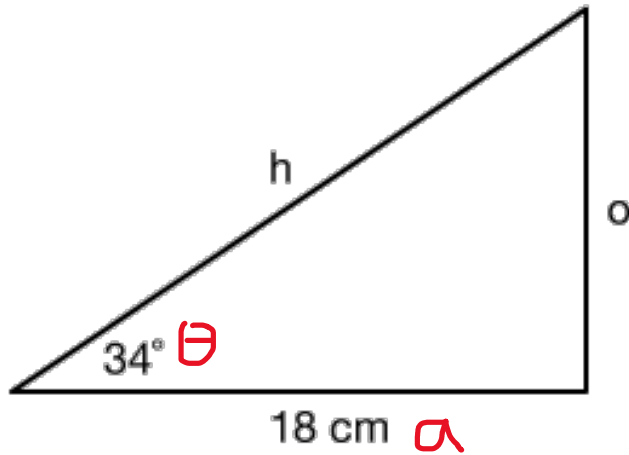$$\sin 20^o = \frac{10}{h}$$

$$h = \frac{10}{\sin 20^o}$$

$$h = 29.24m$$

Variable is on bottom, so switch!

Solve for o.

$$\tan\theta = \frac{o}{a}$$
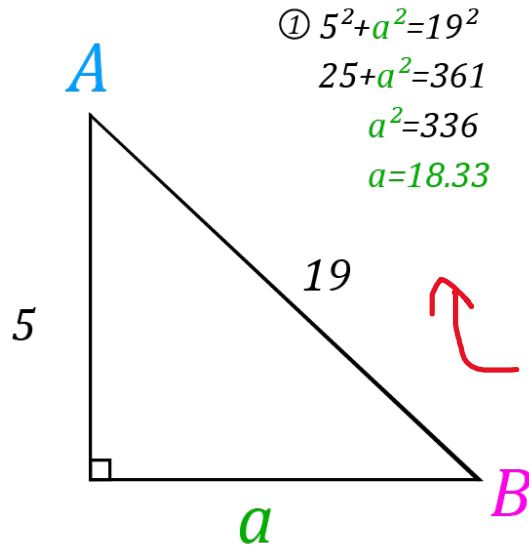
$$\tan 34° = \frac{o}{18}$$

$$\tan(34°) \times 18$$

$$o = 12.1 \text{ cm}$$

① $5^2 + a^2 = 19^2$
　$25 + a^2 = 361$
　$a^2 = 336$
　$a = 18.33$

② $\cos A = \dfrac{5}{19}$

$A = \cos^{-1}\left(\dfrac{5}{19}\right)$

$A = 74.74°$

③ $A + B + 90° = 180°$
　$74.74° + B + 90° = 180°$
　$B = 15.26°$

When finding an angle remember to use inverse trig (2nd function first)

Calcworkshop.com

Slope/Pitch $= \dfrac{rise}{run} = \dfrac{y2-y1}{x2-x1}$ **(x1, y1) is one ordered pair, (x2, y2 is the other)**

Example: Find the slope using the points below

$$\left(x_1, y_1\right) \quad \left(x_2, y_2\right)$$

$\downarrow \qquad \downarrow$

$$\left(3,5\right) \text{ and } \left(7,13\right)$$

$x_1 = 3$ $y_1 = 5$ $x_2 = 7$ $y_2 = 13$
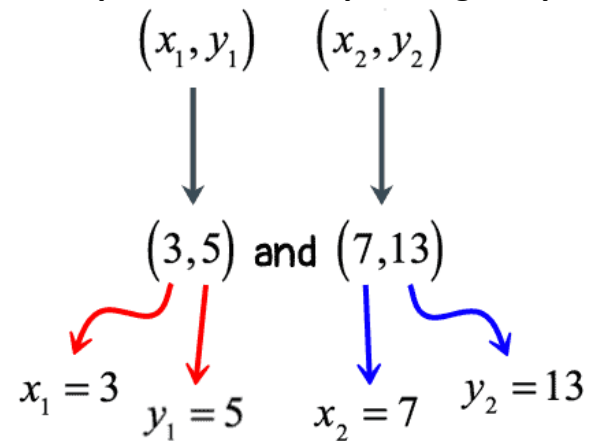
Slope $= \dfrac{y2-y1}{x2-x1} = \dfrac{13-5}{7-3} = \dfrac{8}{4} = 2$

Data and Probability:

Statistics is a field of mathematics that deals with the collecting and summarizing of data. There are four measures of central tendency that we will be working with:

Mean (sometimes called average). To calculate the mean we add up all the values and then divide by the number of values we have.

Median is the center or middle value. To find the median we order all the numbers from smallest to largest and then pick the middle number.
(If there are two numbers in the middle we take the mean of those two numbers.)

Mode is the most frequent value. To find the mode we look for the value that occurs most often.

Range is the difference between the highest and lowest values. (Subtract the lowest value from the highest value)

Theoretical Probability:

P(A) = number of favorable outcomes for event A
         total number of outcomes in sample

Experimental Probability:

P(A) = number of times event actually occurs
         total number of trials