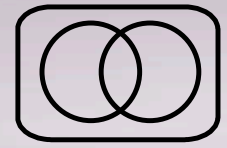
≈ { } √  ∞ Σ π

38% MATH 1030 #5b 17/100

Use and Abuse of Percentages

Describing Change

142% 33 1/3%

EX 1 Eighty percent of students need a review before moving on to a new topic. If there are 48 students in the class, how many need a review?

$\underset{\text{part}}{x}$ is $\underline{80}$ % of $\underset{\text{whole}}{48}$

$x = 0.80(48)$

$x = 38.4$

about 38 (or 39) students in this class need a review

Describing Change

(using percentages to describe change)

Absolute Change = new value - reference value

ex Last year, the price of gas was about $3.45/gallon. Now, the price of gas is about $3.20/gal. The absolute change is $3.45 - 3.20 = \$0.25/gal.

Relative Change = $\frac{\text{absolute change}}{\text{reference value}}$.

ex for above example, rel. change = $\frac{0.25}{3.45} \approx 7.25\%$ decrease.

EX 2: You bought a car for $17,500. Now it is worth $5,000. Find the absolute and relative change in the car's value.

EX 3: Find the relative change when a quantity

a) triples.

b) quadruples.

Comparing with Percents (using percentages for comparisons)

Absolute difference = compared value - reference value.

ex My height is 65.5" and my best friend's height is 68". abs. diff = 68 - 65.5 = 2.5"

Relative difference = $\frac{\text{absolute difference}}{\text{reference value}}$.

ex For above example rel. diff. = $\frac{2.5''}{65.5''} \approx 3.82\%$ (i.e. my friend is 3.82% taller than I am)

EX 4: Compare the life expectancy in Canada (81.2 years) to life expectancy in Russia (65.9 years).

abs. difference = 81.2 - 65.9 = 15.3 yrs

① rel. difference = $\frac{15.3}{81.2} \approx 0.1884 = 18.84\%$

② rel. difference = $\frac{15.3}{65.9} \approx 0.2322 = 23.22\%$

⇒ we could say that ① Russians live about 18.8% shorter than Canadians (on average)

OR ② Canadians live about 23.2% longer than Russians (on average)

Of vs More or Less Than

x = original value of stock

A stock has gone to:

150% of the original price.

$1.5x$

- "of" following percent/fraction/decimal means multiplication
- "more or less than" turns into addition or subtraction

150% more than the original price.

$x + 1.5x = 2.5x$

50% less than the original price.

$x - 0.5x = 0.5x$

(ex: 35% less than original price

$x - 0.35x = 0.65x$)

EX 5: State each answer as a percent.

a) Saul earns 45% more than Carrie. How many times larger is his income?

Carrie earns x dollars

$x + 0.45x = 1.45x$ 1.45 times larger than Carrie's income

b) A store is having a 40% off sale. How does the item's price compare with that of the original?

x = the original price

$x - 0.4x = 0.6x$ it's 60% of the original price

c) The area of Colorado is 24% less than the area of Norway. Norway's area is what percent of Colorado's?

x = area of Norway

c = Colorado area $= x - 0.24x = 0.76x$

$$\frac{c}{0.76} = \frac{0.76x}{0.76}$$

$$x \simeq 1.32c$$

$\Rightarrow$ area of Norway is 1.32 times the area of Colorado, which means it's 132% of Colorado's area.