

TOPIC: PERCENT PROBLEM SOLVING

Translating Percent Problems

◆ Recall: A **percent** is a part per 100 which can be written as a fraction (ratio) or decimal.

$$10\% = \frac{\quad}{100} =$$

► When solving problems with percents, *always* convert to _____ form.

New

Translate Percent Problems

"A number is 10% of 50"

Recall
 $is \rightarrow =$
 $of \rightarrow \cdot$

Partial = **Percent as decimal** • **Whole**

EXAMPLE

Translate & solve the percent problems below.

(A) 4 is 5% of what number?

(B) 35 is what percent of 28?



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EXAMPLE

Translate & solve the percent problem below.

(*A*) A number is 50% of 18

(*B*) A number is 18% of 50

(*C*) Why are part (*A*) and (*B*) related?

EXAMPLE

Caroline earns \$3452 a month. She pays \$1140 each month in rent. How much of her monthly paycheck goes towards rent?

PRACTICE

Translate and solve the percent problems below.

(*A*) Saphia's lunch bill was \$17.65. She wants to leave an 18% tip. How much should the tip be?

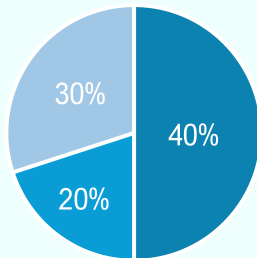
(*B*) Carson brought some new sneaker on sale for \$250. The sale price was 65% of the original price. What was the original price?

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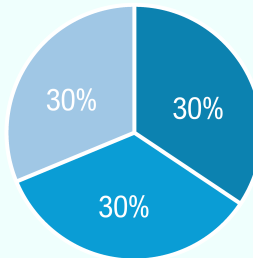
EXAMPLE

Evaluate the percentages in each pie graph and tell whether they are correct or incorrect?

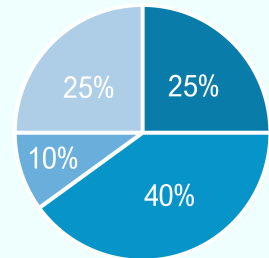
(A)



(B)



(C)



EXAMPLE

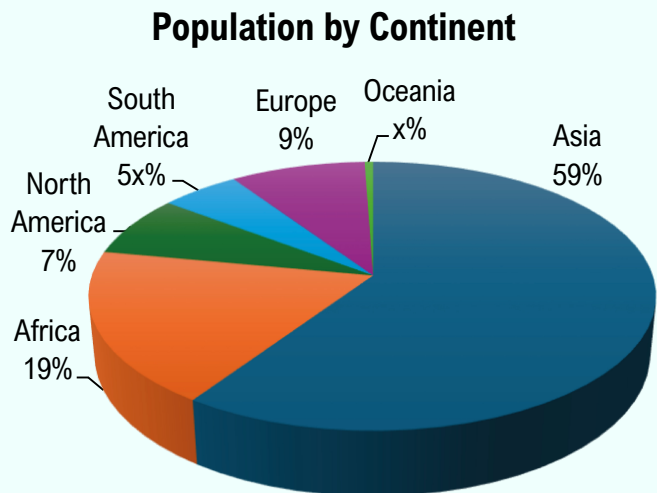
The circle graph below shows the world population by continent. Use this graph to answer the questions below.

(A) What percent of people do not live in Asia?

(B) If the total world population is 8.142 billion people, how many people live in Africa?

(C) What percent of the world population lives in Oceania?

(D) What percent of the world population lives in South America?



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PRACTICE

Solve the word problems below.

(A) If sales tax on a \$36 pair of shoes is \$1.26, find the sales tax on a \$250 pair of shoes.

(B) Suppose the local sales tax rate is 6.5% and you buy a car for \$12,500. What is the car's total cost?

Hint: Find how much tax is due first.

EXAMPLE

Laundry detergent costs \$6.49 a pack. You have a coupon that gets you \$1 off each pack if you purchase 3 packs. If sales tax is 7.5% how much will you be charged for purchasing 3 packs of laundry detergent using the coupon?

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Percent Change

◆ **Percent Change** is the _____ between two values measured as a percent of the _____ value.

► If the change is [**POSITIVE** | **NEGATIVE**], then we call it a percent [**INCREASE** | **DECREASE**].

EXAMPLE

If the price of an item was \$50 and is now \$60, find the percent change in price.

New

Percent Change

New Price: _____ Original Price: _____

Change in Price: = _____ = _____ = _____

Recall

$$\text{percent} = \frac{\text{partial amount}}{\text{whole amount}}$$

Percent [**INCREASE** | **DECREASE**]: _____

$$\text{percent change} = \frac{\text{amount}}{\text{amount}}$$

EXAMPLE

Due to illness the rabbit population in New Zealand changed from 12,000 in 2022 to 8,000 in 2023. Find the percent change in population.

New Population: _____ Original Population: _____ Change in Population: _____

Percent [**INCREASE** | **DECREASE**]: _____

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PRACTICE

Find the percent increase/decrease.

(A) A city's population grew from 120,000 to 138,000 people in one year. What is the percent increase in population?

(B) A smartphone originally costs \$800 but is now sold for \$680. Determine the percent decrease in price.

PRACTICE

Find the amount increase/decrease.

(A) Last season, a farmer harvested 500 kg of rice. Due to improved techniques, the harvest is estimated to increase by 20% this season. How much rice is the farmer looking to harvest this season?

(B) A reservoir's water level decreased by 20% over the summer due to evaporation. If the water level is currently at 120 million liters, how much water was there initially?

PRACTICE

A square garden has sides of 8 ft. The gardener reduces each side by 1 ft to make space for a pathway. What is the percent decrease in the perimeter of the garden?

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Discount and Mark-up Problems

◆ A [**DISCOUNT | MARK UP**] is how much the price of an item [**DECREASES | INCREASES**].

► To solve, we apply the same strategy we use with percents.

EXAMPLE

(A) A used gaming system originally purchased for \$385 was sold at a garage sale at a discount of 85% the original price. What was the discount and new price?

Recall

partial amount = percent · whole amount

New

_____ = percent · _____

New price = original price _____

(B) An engagement ring was purchased at wholesale for \$1800. The retailer marked it up 70%. What was the mark up and new price?

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PRACTICE

(*A*) Ivy wants to buy a dress that originally costs \$120. The store is having a sale and offers \$35 off the original price. What is the sale price of the dress?

(*B*) There is a winter coat I've been eyeing that costs \$250. If it is bought in cash, I would receive a 20% discount. How much would I pay for that winter coat if I buy it in cash now?

PRACTICE

(*A*) A pair of running shoes costs \$80. The store is offering a 25% discount. Calculate the amount of discount and the sale price of the shoes.

(*B*) A smartphone originally costs \$800. It is on sale for \$680. Calculate the percent discount.

PRACTICE

(*A*) The bookstore buys a set of novels for \$120 and sells it for \$150. How much did they mark up?

(*B*) A patient was prescribed a medication dose. It was increased by 15% after 3 days, and the new dosage is 23 cc. What was the original dosage?

(*C*) In a city, the water company increased the monthly water bill by 8%. The initial monthly cost is \$54. What is the cost after the increase?

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Simple Interest

◆ Recall: The formula $I = PRT$ means **Simple Interest** = **principal** · **rate** · **time**

► To solve simple interest problems, we apply our same strategy for solving problems with formulas.

EXAMPLE

Jenny borrowed \$1,275 from a local sponsor to fund a school science fair. The sponsor charges 6.8% simple interest per year. How much interest will Jenny owe after 4 years?

Recall

Solving Formulas

- 1) Identify known and unknown quantities
- 2) Plug in known quantities
- 3) Solve for unknown

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PRACTICE

(A) The student council borrowed \$1,275 from a local sponsor to organize a school event. The sponsor charges 6.5% simple interest per year. How much interest will the student council owe after a year?

(B) A community center paid \$432 in simple interest after 3 years on borrowed funds for new equipment. The interest rate was 4.5% per year. What was the original amount borrowed?

EXAMPLE

A bank loaned \$1,200 at 5% simple interest per year. What is the total amount to be repaid after 4 years?

PRACTICE

(A) A 10-year government bond paid 5.8% simple interest per year. Over the 10 years, the bond earned \$4,640 in interest. What was the principal of the bond?

(B) Sofia plans to buy a car. Her loan statement indicates she will pay \$1,350 in interest for a 3-year loan at 9% simple interest per year. How much did Sofia borrow for the car?