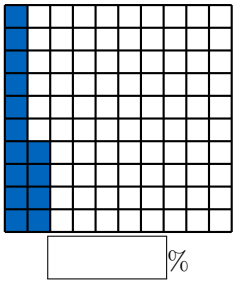
PERCENTAGES

A DEFINITION

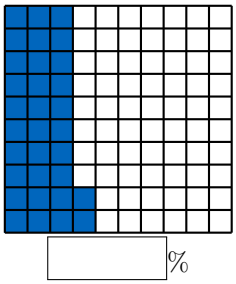
A.1 CONVERTING FRACTIONS MODELS INTO PERCENTAGES

Ex 1: What percent of the squares are colored ?



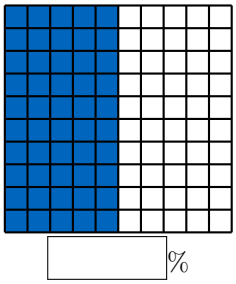
$\square$ %

Ex 2: What percent of the squares are colored?



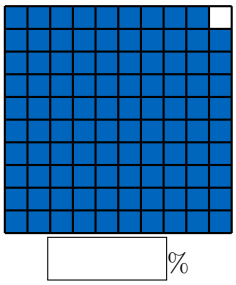
$\square$ %

Ex 3: What percent of the squares are colored?



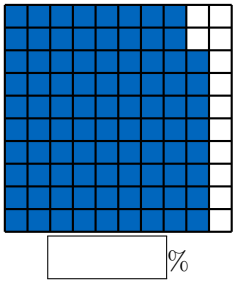
$\square$ %

Ex 4: What percent of the squares are colored?



$\square$ %

Ex 5: What percent of the squares are colored?



$\square$ %

B PERCENTAGE AS A NUMBER

B.1 CONVERTING FRACTIONS INTO PERCENTAGES

Ex 6: Convert the fraction $\frac{1}{2}$ into a percentage.

$$\frac{1}{2} = \square\ \%$$

Ex 7: Convert the fraction $\frac{3}{4}$ into a percentage.

$$\frac{3}{4} = \square\ \%$$

Ex 8: Convert the fraction $\frac{4}{10}$ into a percentage.

$$\frac{4}{10} = \square\ \%$$

Ex 9: Convert the fraction $\frac{4}{5}$ into a percentage.

$$\frac{4}{5} = \square\ \%$$

Ex 10: Convert the fraction $\frac{4}{10}$ into a percentage.

$$\frac{4}{10} = \square\ \%$$

B.2 CONVERTING BAR MODEL TO PERCENTAGES

Ex 11: A bar represents 1. Find the percentage that represents the colored part:

$=$ $\square$ %

Ex 12: A bar represents 1. Find the percentage that represents the colored part:

$=$ $\square$ %

Ex 13: A bar represents 1. Find the percentage that represents the colored part:

$=$ $\square$ %

Ex 14: A bar represents 1. Find the percentage that represents the colored part:

= ☐ %

B.3 CONVERTING PERCENTAGES INTO FRACTIONS

MCQ 15: Write as fraction 87%.

Choose one answer:

- ☐ $\frac{87}{100}$
- ☐ 87
- ☐ $\frac{13}{100}$
- ☐ $\frac{100}{87}$

MCQ 16: Write as fraction 1%.

Choose one answer:

- ☐ $\frac{99}{100}$
- ☐ 1
- ☐ $\frac{100}{1}$
- ☐ $\frac{1}{100}$

MCQ 17: Write as fraction 20%.

Choose 3 answers:

- ☐ $\frac{1}{5}$
- ☐ $\frac{1}{4}$
- ☐ $\frac{2}{10}$
- ☐ $\frac{20}{100}$

MCQ 18: Write as fraction 75%.

Choose 3 answers:

- ☐ $\frac{3}{4}$
- ☐ $\frac{15}{20}$
- ☐ $\frac{7}{10}$
- ☐ $\frac{75}{100}$

Ex 19: Write as a fraction in simplest form 30% = $\frac{\square}{\square}$

Ex 20: Write as a fraction in simplest form 25% = $\frac{\square}{\square}$

Ex 21: Write as a fraction in simplest form 40% = $\frac{\square}{\square}$

B.4 CONVERTING PERCENTAGES INTO DECIMALS

Ex 22: Write as a decimal: 45% = ☐

Ex 23: Write as a decimal: 70% = ☐

Ex 24: Write as a decimal: 23.5% = ☐

Ex 25: Write as a decimal: 120% = ☐

Ex 26: Write as a decimal: 2% = ☐

B.5 CONVERTING DECIMALS INTO PERCENTAGES

Ex 27: Convert the decimal number 0.05 into a percentage.

0.05 = ☐ %

Ex 28: Convert the decimal number 0.95 into a percentage.

0.95 = ☐ %

Ex 29: Convert the decimal number 0.3 into a percentage.

0.3 = ☐ %

Ex 30: Convert the decimal number 1.2 into a percentage.

1.2 = ☐ %

C RATIO TO PERCENTAGE

C.1 FINDING THE PERCENTAGE OF A RATIO OF A PART TO THE WHOLE

Ex 31: You took a quiz in math class and got 21 out of 24 questions correct.
Calculate the percentage of questions you got correct (you can use a calculator).

☐ %

Ex 32: You have 18 red marbles and 32 blue marbles in a jar.
Calculate the percentage of red marbles in the jar (you can use a calculator).

☐ %

Ex 33: In a class, there are 24 girls and 16 boys.
Calculate the percentage of girls in the class (you can use a calculator).

☐ %

Ex 34: In a class, there are 40 students who love math and 10 students who do not.
Calculate the percentage of students who love math in the class (you can use a calculator).

☐ %

Ex 35: In a clinical trial, 100 patients were treated with a new medication, and 45 of them were cured.
Calculate the percentage of patients who were cured by the medication (you can use a calculator).

☐ %

D COMPARING PERCENTAGES

D.1 EVALUATING EFFECTIVENESS USING PERCENTAGES

Ex 36: In a clinical trial, 100 patients were treated with a new medication, and 40 of them were cured. In the same trial, 200 patients were given a placebo, and 70 of them were cured.
Calculate the percentage of patients who were cured by the medication and the placebo.

Medication: ☐% and Placebo: ☐%

Conclusion:
☐ The placebo is more effective than the medication by 30 cured patients.
☐ The placebo is more effective than the placebo by 10%.
☐ The medication is more effective than the placebo by 5%.

Ex 37: In a tennis match, Player A hit 100 first serves, and 60 of them were successful. In the same match, Player B hit 200 first serves, and 140 of them were successful.
Calculate the percentage of successful first serves for both players.

Player A: ☐% and Player B: ☐%

Conclusion:
☐ Player A is more effective than Player B by 80 successful serves
☐ Player A is more effective than Player B by 10%.
☐ Player B is more effective than Player A by 10%.

Ex 38: In School A, there are 120 students, and 60 of them are girls. In School B, there are 200 students, and 100 of them are girls.
Calculate the percentage of girls in both schools.

School A: ☐% and School B: ☐%

Conclusion:
☐ School A has a higher percentage of girls.
☐ School B has a higher percentage of girls.
☐ The percentage of girls is the same in both schools.

Ex 39: In Country A, 150 terawatt-hours (TWh) of electricity were produced, and 90 TWh were from renewable sources. In Country B, 250 terawatt-hours (TWh) of electricity were produced, and 100 TWh were from renewable sources.
Calculate the percentage of electricity produced from renewable sources in both countries (you can use a calculator).

Country A: ☐% and Country B: ☐%

Conclusion:
☐ Country A uses a higher percentage of renewable energy by 20%.
☐ Country B uses a higher percentage of renewable energy by 10%.
☐ Country B uses a higher percentage of renewable energy by 20%.

E FORMULA TO FIND A PART USING PERCENTAGES

E.1 FINDING A PART USING PERCENTAGES

Ex 40: In a school with 200 students, 60% are girls.
Calculate the number of girls in the school (you can use a calculator).

☐ girls

Ex 41: In a library with 300 books, 40% are fiction.
Calculate the number of fiction books in the library (you can use a calculator).

☐ fiction books

Ex 42: In a company with 150 employees, 70% are in the sales department.
Calculate the number of employees in the sales department (you can use a calculator).

☐ employees

Ex 43: In an election, there are 500 votes cast, and 70% are in favor of Candidate A.
Calculate the number of votes for Candidate A (you can use a calculator).

☐ votes

F FORMULA TO FIND THE WHOLE USING PERCENTAGES

F.1 FINDING THE WHOLE USING PERCENTAGES

Ex 44: In a class, 40% of the students are girls, and there are 14 girls in total.
Find the total number of students in the class (you can use a calculator).

☐ students

Ex 45: In a library, 40% of the books are fiction, and there are 120 fiction books in total.
Find the total number of books in the library (you can use a calculator).

☐ books

Ex 46: In a company, 30% of the employees work in the IT department, and there are 45 employees in the IT department.
Find the total number of employees in the company (you can use a calculator).

☐ employees

Ex 47: In a sports team, 25% of the players are goalkeepers, and there are 10 goalkeepers in total.
Find the total number of players on the team (you can use a calculator).

☐ players

G PERCENTAGE INCREASE OR DECREASE

G.1 FINDING THE NEW QUANTITY AFTER AN INCREASE

Ex 48: If the original price of a shirt is 50 dollars and it is increased by 20%, find the new price (you can use a calculator).

$\square$ dollars

Ex 49: If an employee's current salary is 4000 dollars per month and it is increased by 15%, find the new salary (you can use a calculator).

$\square$ dollars per month

Ex 50: The value of a house is currently 300 000 dollars, and it is expected to increase by 12% next year.
Calculate the new value of the house (you can use a calculator).

$\square$ dollars

Ex 51: The population of a town is currently 15 000 people, and it is expected to increase by 8% over the next year.
Calculate the new population of the town (you can use a calculator).

$\square$ people

G.2 FINDING THE NEW QUANTITY AFTER AN DECREASE

Ex 52: If the original price of a jacket is 80 dollars and it is discounted by 25%, find the new price (you can use a calculator).

$\square$ dollars

Ex 53: A restaurant meal costs 50 dollars, and you receive a 15% discount on the total bill. Find the new price after the discount (you can use a calculator).

$\square$ dollars

Ex 54: John originally weighed 80 kg and successfully reduced his weight by 10% through a fitness program. Find his new weight after the reduction (you can use a calculator).

$\square$ kg

Ex 55: A small town had a population of 10 000 people. Due to migration, the population decreased by 15%. Find the new population of the town (you can use a calculator).

$\square$ people

H PERCENTAGE CHANGE

H.1 CONVERTING PERCENTAGE INCREASE OR DECREASE TO PERCENTAGE CHANGE

Ex 56: A store offers a discount of 25%. Determine the percentage change.

$\square$ %

Ex 57: The price of a concert ticket increases by 15%. Determine the percentage change.

$\square$ %

Ex 58: A company's revenue decreases by 12%. Determine the percentage change.

$\square$ %

Ex 59: The population of a city decreases by 8%. Determine the percentage change.

$\square$ %

H.2 FINDING THE MULTIPLIER

Ex 60: A store offers a discount of 25%. Find the multiplier.

$\square$ %

Ex 61: A company gives a salary increase of 15%. Find the multiplier.

$\square$ %

Ex 62: A house's value decreases by 10%. Find the multiplier.

$\square$ %

Ex 63: A gym membership fee is increased by 5%. Find the multiplier.

$\square$ %

H.3 FINDING THE NEW QUANTITY

Ex 64: A store offers a discount of 25% on a t-shirt originally priced at 20 dollars. Find the new price (you can use a calculator).

$\square$ dollars

Ex 65: The population of a town was 10 000 people last year. This year, the population increased by 5%. Find the new population (you can use a calculator).

$\square$ people

Ex 66: A gym membership originally costs 40 dollars per month. The gym is offering a discount of 15%. Find the new monthly price (you can use a calculator).

☐ dollars

Ex 67: Last year, the price of a loaf of bread was 2 dollars. Due to inflation, the price increased by 8% this year. Find the new price of the loaf of bread (you can use a calculator).

☐ dollars

I FORMULA TO FIND THE PERCENTAGE CHANGE

I.1 FINDING THE PERCENTAGE CHANGE

Ex 68: Find the percentage change in Louis's weight from 25 kg to 28 kg (you can use a calculator).

☐ % ☐ increase ☐ decrease

Ex 69: Find the percentage change in the population of a town that increased from 20 000 people to 22 000 people (you can use a calculator).

☐ % ☐ increase ☐ decrease

Ex 70: Find the percentage change in battery life for a device that decreased from 8 hours to 6 hours (you can use a calculator).

☐ % ☐ increase ☐ decrease

Ex 71: Find the percentage change in the number of trees in a park that decreased from 500 to 450 trees (you can use a calculator).

☐ % ☐ increase ☐ decrease