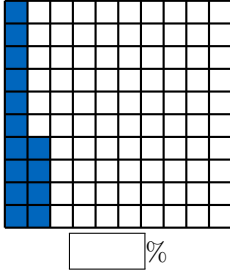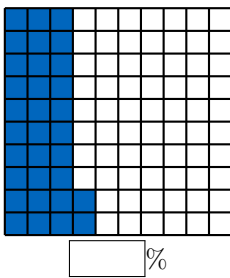# PERCENTAGES

A WHAT IS A PERCENTAGE?

A.1 CONVERTING FRACTION MODELS TO PERCENTAGES
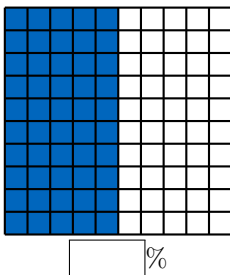
Ex 1: What percent of the squares are colored?

[___]%
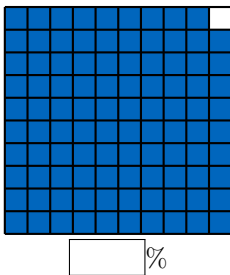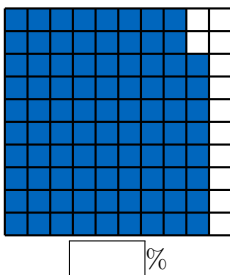
Ex 2: What percent of the squares are colored?

[___]%

Ex 3: What percent of the squares are colored?
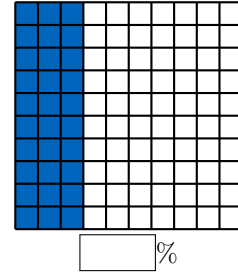
[___]%

Ex 4: What percent of the squares are colored?

[___]%

Ex 5: What percent of the squares are colored?

[___]%

Ex 6: What percent of the squares are colored?

[___]%

B CONVERTING BETWEEN FORMS

B.1 CONVERTING FRACTIONS INTO PERCENTAGES

Ex 7: Convert into a percentage.

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

Ex 8: Convert into a percentage.

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

Ex 9: Convert into a percentage.

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

Ex 10: Convert the fraction into a percentage.

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

B.2 CONVERTING PERCENTAGES INTO DECIMALS

Ex 11: Convert into a decimal number.

$$45\% = \boxed{}$$

Ex 12: Convert into a decimal number.

$$70\% = \boxed{}$$

Ex 13: ⊞ Convert into a decimal number.

$$23.5\% = \boxed{}$$

Ex 14: ⊞ Convert into a decimal number.

$$2\% = \boxed{}$$

B.3 CONVERTING DECIMALS INTO PERCENTAGES

Ex 15: ⊞ Convert into a percentage.

$$0.05 = \boxed{}\,\%$$

Ex 16: ⊞ Convert into a percentage.

$$0.95 = \boxed{}\,\%$$
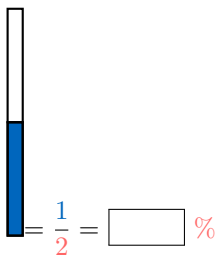
Ex 17: ⊞ Convert into a percentage.

$$0.3 = \boxed{}\,\%$$
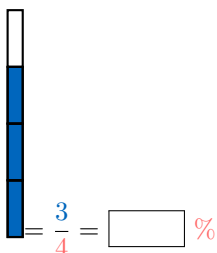
Ex 18: ⊞ Convert into a percentage.

$$0.2 = \boxed{}\,\%$$

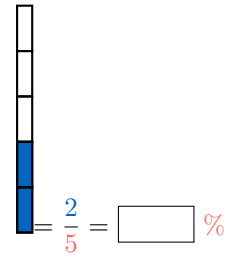## B.4 CONVERTING FRACTIONS TO PERCENTAGES
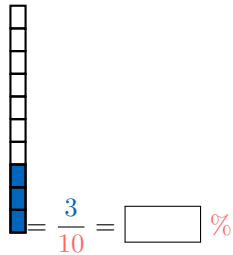
Ex 19: ⊞ Convert into a percentage.

$$= \frac{1}{2} = \boxed{}\,\%$$

Ex 20: ⊞ Convert into a percentage.

$$= \frac{3}{4} = \boxed{}\,\%$$

Ex 21: ⊞ Convert into a percentage.

$$= \frac{2}{5} = \boxed{}\,\%$$

Ex 22: ⊞ Convert into a percentage.

$$= \frac{3}{10} = \boxed{}\,\%$$

B.5 CONVERTING PERCENTAGES INTO FRACTIONS

Ex 23: Convert into a fraction (simplify the fraction if possible).

$$1\% = \frac{\boxed{}}{\boxed{}}$$

Ex 24: Convert into a fraction (simplify the fraction if possible).

$$50\% = \frac{\boxed{}}{\boxed{}}$$

Ex 25: Convert into a fraction (simplify the fraction if possible).

$$25\% = \frac{\boxed{}}{\boxed{}}$$

Ex 26: Convert into a fraction (simplify the fraction if possible).

$$80\% = \frac{\boxed{}}{\boxed{}}$$

C RATIO TO PERCENTAGE

C.1 FINDING THE PERCENTAGE OF A RATIO

Ex 27: ⊞ You took a quiz in math class and got 21 out of 24 questions correct.
Calculate the percentage of questions you got correct.

$$\boxed{}\,\%$$

Ex 28: ⊞ You have 18 red marbles and 32 blue marbles in a jar.
Calculate the percentage of red marbles in the jar.

$$\boxed{}\,\%$$

Ex 29: In a class, there are 24 girls and 16 boys. Calculate the percentage of girls in the class.

☐ %

Ex 30: 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.

☐ %

Ex 31: In a clinical trial, 200 patients were treated with a new medication, and 45 of them were cured. Calculate the percentage of patients who were cured by the medication.

☐ %

D COMPARING RATIOS USING PERCENTAGES

D.1 COMPARING EFFECTIVENESS USING PERCENTAGES

Ex 32: 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.

1. Calculate the percentage of patients who were cured by the medication and the placebo.

2. Conclude which is more effective for curing patients.

Ex 33: In a basketball season, Player A attempted 143 three-point shots and succeeded 58 times. Player B attempted 175 three-point shots and succeeded 64 times.

1. Calculate the percentage of successful three-point shots for both players.

2. Conclude which player is more effective at three-point shooting.

Ex 34: In Country X, there are 120 members of parliament, of which 54 are women. In Country Y, there are 150 members of parliament, of which 30 are women.

1. Calculate the percentage of women in parliament in both countries.

2. Conclude which country has a better representation of women in parliament.

Ex 35: In Oak School, 132 students answered a survey and 94 said they love maths. In Pine School, 156 students answered the same survey and 84 said they love maths.

1. Calculate the percentage of students who love maths in each school.

2. Conclude which school has a higher proportion of students who love maths.

E FINDING THE PART OR THE WHOLE

E.1 FINDING A PART USING PERCENTAGES

Ex 36: In a school with 200 students, 60% are girls. Calculate the number of girls in the school.

| | girls

| | dollars

Ex 37: In a library with 300 books, 40% are fiction. Calculate the number of fiction books in the library.

| | fiction books

Ex 45: If an employee's current salary is 4000 dollars per month and it is increased by 15%, find the new salary.

| | dollars per month

Ex 38: In a company with 150 employees, 70% are in the sales department. Calculate the number of employees in the sales department.

| | employees

Ex 46: 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.

| | dollars

Ex 39: In an election, there are 500 votes cast, and 70% are in favor of Candidate A. Calculate the number of votes for Candidate A.

| | votes

Ex 47: 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.

| | people

E.2 FINDING THE WHOLE USING PERCENTAGES

Ex 40: 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.

| | students

F.2 FINDING THE NEW QUANTITY AFTER A DECREASE

Ex 48: If the original price of a jacket is 80 dollars and it is discounted by 25%, find the new price.

| | dollars

Ex 41: 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.

| | books

Ex 49: A restaurant meal costs 50 dollars, and you receive a 15% discount on the total bill. Find the new price after the discount.

| | dollars

Ex 42: 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.

| | employees

Ex 50: John originally weighed 80 kg and successfully reduced his weight by 10% through a fitness program. Find his new weight after the reduction.

| | kg

Ex 43: 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.

| | players

Ex 51: 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.

| | people

F PERCENTAGE INCREASE AND DECREASE

F.1 FINDING THE NEW QUANTITY AFTER AN INCREASE

Ex 44: If the original price of a shirt is 50 dollars and it is increased by 20%, find the new price.

G PERCENTAGE CHANGE

G.1 CONVERTING PERCENTAGE INCREASE OR DECREASE TO PERCENTAGE CHANGE

Ex 52: A store offers a discount of 25%. Determine the percentage change.

| | %

Ex 53: The price of a concert ticket increases by 15%. Determine the percentage change.

[____]%

Ex 54: A company's revenue decreases by 12%. Determine the percentage change.

[____]%

Ex 55: The population of a city decreases by 8%. Determine the percentage change.

[____]%

Ex 56: A factory increases its production by 12% this year compared to last year. Determine the percentage change.

[____]%

G.2 FINDING THE MULTIPLIER

Ex 57: A store offers a discount of 25%. Find the multiplier.

[_____]

Ex 58: A company gives a salary increase of 15%. Find the multiplier.

[_____]

Ex 59: A house's value decreases by 10%. Find the multiplier.

[_____]

Ex 60: A gym membership fee is increased by 5%. Find the multiplier.

[_____]

G.3 FINDING THE NEW QUANTITY

Ex 61: A store offers a discount of 25% on a t-shirt originally priced at $20. Find the new price.

[____] dollars

Ex 62: The population of a town was 10 000 people last year. This year, the population increased by 5%. Find the new population.

[_____] people

Ex 63: A gym membership originally costs $40 per month. The gym is offering a discount of 15%. Find the new monthly price.

[____] dollars

Ex 64: Last year, the price of a loaf of bread was $2. Due to inflation, the price increased by 8% this year. Find the new price of the loaf of bread.

[____] dollars

H CALCULATING THE PERCENTAGE CHANGE

H.1 FINDING THE PERCENTAGE CHANGE

Ex 65: Find the percentage change in Louis's weight from 25 kg to 28 kg.

[____]% ☐ increase ☐ decrease

Ex 66: Find the percentage change in the population of a town that increased from 20 000 people to 22 000 people.

[____]% ☐ increase ☐ decrease

Ex 67: Find the percentage change in battery life for a device that decreased from 8 hours to 6 hours.

[____]% ☐ increase ☐ decrease

Ex 68: Find the percentage change in the number of trees in a park that decreased from 500 to 450 trees.

[____]% ☐ increase ☐ decrease

Ex 69: Find the percentage change in the price of a cinema ticket that increased from $10 to $12.

[____]% ☐ increase ☐ decrease