CHAPTER

6 Percent

Lesson 6.1 Understanding Percent

Find the missing numerators and denominators.

1. $\dfrac{1}{4} = \dfrac{5}{\boxed{}} = \dfrac{\boxed{}}{100}$

2. $\dfrac{3}{5} = \dfrac{\boxed{}}{25} = \dfrac{60}{\boxed{}}$

Express each fraction in simplest form.

3. $\dfrac{24}{100}$

4. $\dfrac{140}{210}$

Express each fraction as a decimal.

5. $\dfrac{33}{100}$

6. $\dfrac{60}{100}$

Solve.

Example

80 out of 100 sticks of clay are yellow. What percent of the sticks of clay are yellow?

80 out of 100 → $\dfrac{\boxed{80}}{100}$

= _____80_____ %

> Percent is written as %, which means *per hundred*.

_____80_____% of the sticks of clay are yellow.

7. 53 out of 100 erasers are blue. What percent of the erasers are blue?

53 out of 100 → $\dfrac{\boxed{}}{100}$ = _____%

_____% of the erasers are blue.

8. 69 out of 100 students play a musical instrument. What percent of the students play a musical instrument?

9. Out of 100 bottles, 47 are filled with water. What percent of the bottles are filled with water?

10. Out of 100 apples in a basket, 80 are red apples. What percent of the apples are red apples?

Solve.

Example

Out of 50 bagels on a tray, 32 of them are oatmeal. What percent of the bagels are oatmeal?

32 out of 50 → $\dfrac{\boxed{32}}{50}$
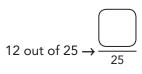
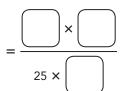$= \dfrac{\boxed{32} \times \boxed{2}}{50 \times \boxed{2}}$

Multiply both the numerator and denominator of the fraction by the same number to make the denominator 100. Then express the fraction as a percent.

$= \dfrac{\boxed{64}}{100}$

$= \underline{64}\%$

_____64_____% of the bagels are oatmeal.

11. A bouquet of 25 flowers has 12 roses. What percent of the flowers are roses?

12 out of 25 → $\dfrac{\boxed{}}{25}$

$= \dfrac{\boxed{} \times \boxed{}}{25 \times \boxed{}}$

$= \dfrac{\boxed{}}{100}$

$=$ _____%

_____% of the flowers are roses.

12. A bag contains 20 marbles, of which 11 are green. What percent of the marbles are green?

13. Out of 50 books, 30 are novels. What percent of the books are novels?

14. 16 out of 25 tables are wooden. What percent of the tables are wooden?

Name: _____   Date: _____

Solve.

> *Example*
>
> Out of 3,000 books, 180 are non-fiction. The rest are fiction.
>
> **a)** What percent of the books are non-fiction?
>
> 180 out of 3,000 → $\dfrac{180}{3{,}000}$
>
> $$= \frac{180 \div 10}{3{,}000 \div 10}$$
>
> First, divide both the numerator and denominator of the fraction by the common factors to make the denominator 100. Then express the fraction as a percent.
>
> $$= \frac{18 \div 3}{300 \div 3}$$
>
> $$= \frac{6}{100}$$
>
> $$= \underline{\quad 6 \quad}\%$$
>
> $\underline{\quad 6 \quad}$% of the books are non-fiction.
>
> **b)** What percent of the books are fiction?
>
> 100% − $\underline{\quad 6 \quad}$ % = $\underline{\quad 94 \quad}$ %
>
> $\underline{\quad 94 \quad}$ % of the books are fiction.

15. Of the 200 animals in a pet shop, 38 are hamsters.

a) What percent of the animals are hamsters?

38 out of 200 → $\dfrac{\boxed{}}{200}$

$$= \frac{\boxed{} \div \boxed{}}{200 \div \boxed{}}$$

$$= \frac{\boxed{}}{\boxed{}}$$

= _____%

_____% of the animals are hamsters.

b) What percent of the animals are not hamsters?

100% − _____ % = _____ %

_____ % of the animals are not hamsters.

16. Of the 400 students at a carnival, 28 sell ride coupons.

a) What percent of the students at the carnival sell ride coupons?

b) What percent of the students at the carnival do not sell ride coupons?

17. Out of 1,800 flags, 36 are purple. What percent of the flags are not purple?

Name: _____ Date: _____

Express each percent as a fraction or a mixed number in simplest form.

Example

$16\% = \dfrac{\boxed{16}}{100}$

$= \dfrac{\boxed{16} \div \boxed{4}}{100 \div \boxed{4}}$

$= \dfrac{\boxed{4}}{25}$

First, express the percent as a fraction with a denominator of 100. Then divide both the numerator and denominator of the fraction by the greatest common factor.

18. $28\% = \dfrac{\boxed{}}{100}$

$= \dfrac{\boxed{} \div \boxed{}}{100 \div \boxed{}}$

$= \underline{}$

19. $110\% = \dfrac{\boxed{}}{100}$

$= \dfrac{\boxed{} \div \boxed{}}{100 \div \boxed{}}$

$= \underline{}$

20. $64\% = \underline{}$

21. $225\% = \underline{}$

Express each percent as a decimal.

Example

$39\% = \dfrac{\boxed{39}}{100}$

$= \underline{0.39}$

First, express the percent as a fraction with a denominator of 100. Then divide the numerator by 100 to express the fraction as a decimal.

22. $65\% = \dfrac{\boxed{}}{100}$

$= \underline{}$

23. $9\% = \dfrac{\boxed{}}{100}$

$= \underline{}$

24. $173\% = \underline{}$

25. $280\% = \underline{}$

8. Brand A:

$\underline{3}$ min → $\underline{450}$ pages

$\underline{1}$ min → $\underline{450}$ ÷ $\underline{3}$ = $\underline{150}$ pages

Brand A can print $\underline{150}$ pages per minute.

Brand B:

$\underline{5}$ min → $\underline{625}$ pages

$\underline{1}$ min → $\underline{625}$ ÷ $\underline{5}$ = $\underline{125}$ pages

Brand B can print $\underline{125}$ pages per minute.

Comparing the number of pages both printers can print per minute, Brand $\underline{A}$ can print more per minute. Brand $\underline{A}$ is the faster printer so Patrick should buy it.

9. Machine B

10. Matilda charges less per hour so Mr. Taylor should choose Matilda.

11. a) Method 1

$\underline{1}$ h → $\underline{35}$ mi

$\underline{4}$ h → $\underline{4}$ × $\underline{35}$ = $\underline{140}$ mi

The car can travel $\underline{140}$ miles in 4 hours.

b) Method 2

Distance = Speed × Time

= $\underline{35}$ × $\underline{4}$

= $\underline{140}$ mi

The car can travel $\underline{140}$ miles in 4 hours.

12. Method 1

1 h → 8 mi

$1\frac{1}{2}$ h → $1\frac{1}{2}$ × 80 = 120 mi

The motorcycle can travel 120 miles in $1\frac{1}{2}$ hours.

Method 2

Distance = Speed × Time

= 80 × $1\frac{1}{2}$

= 120 mi

The motorcycle can travel 120 miles in $1\frac{1}{2}$ hours.

13. $7\frac{1}{2}$ miles

14. Method 1

$\underline{45}$ mi → $\underline{1}$ h

$\underline{270}$ mi → $\underline{270}$ ÷ $\underline{45}$ = $\underline{6}$ h

It will take the vehicle $\underline{6}$ hours to travel a distance of 270 miles.

Method 2

Time = Distance ÷ Speed

= $\underline{270}$ ÷ $\underline{45}$

= $\underline{6}$ h

It will take the vehicle $\underline{6}$ hours to travel a distance of 270 miles.

15. Method 1

80 mi → $\underline{1}$ h

480 mi → 480 ÷ 80 = $\underline{6}$ h

It will take Jorge 6 hours to travel from City A to City B.

Method 2

Time = Distance ÷ Speed

= 480 ÷ 80

= 6 h

It will take Jorge 6 hours to travel from City A to City B.

16. 8 hours

17. Distance between Town X and Town Z

= $\underline{280}$ + $\underline{530}$

= $\underline{810}$ mi

Total time taken to travel from Town X to Town Z

= $\underline{6}$ + $\underline{12}$

= $\underline{18}$ h

Average speed = $\underline{810}$ ÷ $\underline{18}$

= $\underline{45}$ mi/h

The average speed of the truck for the whole journey is $\underline{45}$ miles per hour.

18. 40 miles per hour

19. 44 miles per hour

Chapter 6

Lesson 6.1

1. $\frac{1}{4} = \frac{5}{\boxed{20}} = \frac{\boxed{25}}{100}$

2. $\frac{3}{5} = \frac{\boxed{15}}{25} = \frac{60}{\boxed{100}}$

3. $\frac{6}{25}$ **4.** $\frac{2}{3}$

5. 0.33   **6.** 0.6

7. 53 out of 100 → $\frac{\boxed{53}}{100}$

= $\underline{53}$%

$\underline{53}$% of the erasers are blue.

8. 69%   **9.** 47%

10. 80%

11. 12 out of 25 → $\frac{\boxed{12}}{25}$

= $\frac{\boxed{12} \times \boxed{4}}{25 \times \boxed{4}}$

= $\frac{\boxed{48}}{100}$

= $\underline{48}$%

$\underline{48}$% of the flowers are roses.

12. 55%   **13.** 60%

14. 64%

15. a) 38 out of 200 → $\dfrac{\boxed{38}}{200}$

$$= \dfrac{\boxed{38} \div \boxed{2}}{200 \div \boxed{2}}$$

$$= \dfrac{\boxed{19}}{\boxed{100}}$$

$$= \underline{19}\%$$

      $\underline{19}$% of the animals are hamsters.

   b) $\underline{100}\% - \underline{19}\% = \underline{81}\%$

      $\underline{81}$% of the animals are not hamsters.

16. a) 7%   **b)** 93%

17. 98%

18. $28\% = \dfrac{28}{\boxed{100}}$

$$= \dfrac{\boxed{28} \div \boxed{4}}{100 \div \boxed{4}}$$

$$= \dfrac{7}{\underline{25}}$$

19. $110\% = \dfrac{\boxed{110}}{100}$

$$= \dfrac{\boxed{110} \div \boxed{10}}{100 \div \boxed{10}}$$

$$= \dfrac{11}{\underline{10}}$$

20. $\dfrac{16}{25}$ **21.** $\dfrac{9}{4}$

22. $65\% = \dfrac{\boxed{65}}{100}$

$$= \underline{0.65}$$

23. $9\% = \dfrac{\boxed{9}}{100}$

$$= \underline{0.09}$$

24. 1.73   **25.** 2.8

Lesson 6.2

1. 24   **2.** 45

3. $13\dfrac{1}{3}$ **4.** $6\dfrac{2}{7}$

5. $\dfrac{1}{6} = \dfrac{1}{6} \times \boxed{100}\%$

$$= \dfrac{\boxed{100}}{\boxed{6}}$$

$$= 16\dfrac{2}{3}\%$$

6. $1\dfrac{2}{3} = 1\dfrac{2}{3} \times \boxed{100}\%$

$$= \dfrac{\boxed{5}}{3} \times \boxed{100}\%$$

$$= \dfrac{\boxed{500}}{\boxed{3}}$$

$$= 166\dfrac{2}{3}\%$$

7. $62\dfrac{1}{2}\%$ **8.** $257\dfrac{1}{7}\%$

9. Method 1

    $0.58 = \dfrac{\boxed{58}}{100}$

$$= \underline{58}\%$$

Method 2

    $0.58 = 0.58 \times \boxed{100}\%$

$$= \underline{58}\%$$

10. 73%   **11.** 40%

12. 2%   **13.** 501%

14. $37\dfrac{1}{2}\% = \dfrac{75}{2}\%$

$$= \dfrac{75}{2} \div 100$$

$$= \dfrac{75}{2} \times \dfrac{1}{100}$$

$$= \dfrac{75}{200}$$

$$= \dfrac{3}{8}$$

15. $\dfrac{21}{400}$ **16.** $\dfrac{59}{800}$

17. $\dfrac{2}{3}$ **18.** $\dfrac{5}{9}$