

Review 1

Understanding Whole Numbers

Millions Period			Thousands Period			Ones Period		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		4	2	0	1	5	7	8
4 million			201 thousand			578		

- *Standard form:* 4,201,578
- To find the value of a digit, multiply the digit by its place value.
4 stands for $4 \times 1,000,000$, or 4,000,000
- *Expanded form:*
 $4,201,578 = 4,000,000 + 200,000 + 1,000 + 500 + 70 + 8$

Write each number in standard form.

- | | |
|---|--|
| 1. six thousand one hundred four
<u>6,104</u> | 2. fifteen million twenty-one thousand
<u>15,021,000</u> |
| 3. sixty thousand one hundred twelve
<u>60,112</u> | 4. 2 billion, 9 million, 6 thousand, 1
<u>2,009,006,001</u> |
| 5. seventeen thousandths
<u>0.017</u> | 6. twenty-nine hundredths
<u>0.29</u> |
| 7. eight thousand two hundred ninety
<u>8,290</u> | 8. one billion thirty thousand fifty
<u>1,000,030,050</u> |

Use < or > to complete each statement.

- | | | |
|--|--|--|
| 9. 523 <input type="checkbox"/> 567 | 10. 1,292 <input type="checkbox"/> 1,192 | 11. 47 <input type="checkbox"/> 45 |
| 12. 9,120 <input type="checkbox"/> 912 | 13. 53,010 <input type="checkbox"/> 53,100 | 14. 4,293 <input type="checkbox"/> 4,239 |
| 15. 783 <input type="checkbox"/> 738 | 16. 4,121 <input type="checkbox"/> 4,212 | 17. 35,423 <input type="checkbox"/> 34,587 |
| 18. 241,796 <input type="checkbox"/> 242,976 | 19. 182 <input type="checkbox"/> 1,820 | 20. 8,751 <input type="checkbox"/> 8,715 |

Write in order from least to greatest.

- | | |
|---|---|
| 21. 782, 785, 783, 790
<u>782, 783, 785, 790</u> | 22. 1,240; 1,420; 1,346; 1,364
<u>1,240; 1,346; 1,364; 1,420</u> |
| 23. 6,214; 6,124; 6,421; 6,241
<u>6,124; 6,214; 6,241; 6,421</u> | 24. 92,385; 92,835; 93,582; 93,258
<u>92,385; 92,835; 93,258; 93,582</u> |
| 25. 45,923; 54,923; 45,932; 54,932
<u>45,923; 45,932; 54,923; 54,932</u> | 26. 1,111; 1,011; 1,101; 1,110
<u>1,011; 1,101; 1,110; 1,111</u> |

Review 3

Comparing and Ordering Decimals

Use $>$, $<$, or $=$ to show how 4.092 and 4.089 compare.

- ① Write the numbers on grid paper with the decimal points lined up.
- ② Compare digits in the greatest place. Move to the right until you find digits that are not the same.

4 ones = 4 ones
 0 tenths = 0 tenths
 9 hundredths $>$ 8 hundredths
 So, $4.092 > 4.089$.

4	.	0	9	2
4	.	0	8	9

To order numbers from least to greatest:

- ① Write the numbers on grid paper (decimal points lined up) and compare.
- ② Then arrange the numbers from least to greatest.

4.089, 4.09, 4.092

4	.	0	9	2
4	.	0	8	9
4	.	0	9	

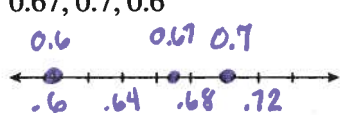
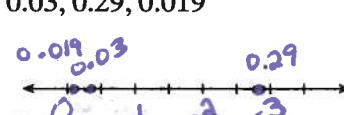
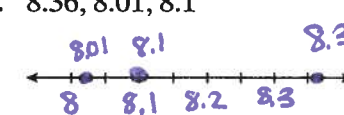
Use $<$, $=$, or $>$ to complete each statement.

- | | | |
|--------------------|--------------------|--------------------|
| 1. $0.01 < 0.15$ | 2. $0.25 > 0.21$ | 3. $0.30 > 0.26$ |
| 4. $0.10 < 0.12$ | 5. $0.35 > 0.34$ | 6. $0.1 < 0.4$ |
| 7. $34.4 = 34.40$ | 8. $0.207 < 0.27$ | 9. $0.08 < 0.40$ |
| 10. $0.32 > 0.309$ | 11. $6.12 > 6.099$ | 12. $0.990 = 0.99$ |
| 13. $2.36 > 2.036$ | 14. $0.05 < 0.15$ | 15. $1.19 < 1.91$ |

Use place value to order the decimals from least to greatest.

- | | | |
|---|---|---|
| 16. 3.46, 3.64, 3.59
<u>3.46, 3.59, 3.64</u> | 17. 22.97, 21.79, 22.86
<u>21.79, 22.86, 22.97</u> | 18. 43, 43.22, 43.022
<u>43, 43.022, 43.22</u> |
| 19. 10.02, 10.2, 1.02
<u>1.02, 10.02, 10.2</u> | 20. 1.09, 1.9, 1.1
<u>1.09, 1.1, 1.9</u> | 21. 7.54, 75.4, 7.4
<u>7.4, 7.54, 75.4</u> |

Order each set of numbers on a number line.

- | | | |
|---|---|--|
| 22. 0.67, 0.7, 0.6
 | 23. 0.03, 0.29, 0.019
 | 24. 8.36, 8.01, 8.1
 |
|---|---|--|

Review 5

Adding and Subtracting Decimals

Add $3.25 + 12.6 + 18.93$.

$$\begin{array}{r} \text{First estimate.} \quad 3.25 \rightarrow 3 \\ \quad \quad \quad \quad \quad 12.6 \rightarrow 13 \\ \quad \quad \quad \quad \quad \underline{+18.93} \rightarrow \underline{19} \\ \quad \quad \quad \quad \quad \quad \quad \quad 35 \end{array}$$

Then follow these steps.

- ① Line up the decimal points. Write in any needed zeros.
- ② Add as you would add whole numbers. Regroup when needed.
- ③ Place the decimal point.

$\begin{array}{r} 3.25 \\ 12.60 \\ \underline{+18.93} \end{array}$	$\begin{array}{r} 3.25 \\ 12.60 \\ \underline{+18.93} \\ 34.78 \end{array}$	$\begin{array}{r} 3.25 \\ 12.60 \\ \underline{+18.93} \\ 34.78 \end{array} \leftarrow \text{Compare to your estimate.}$
--	---	---

To subtract decimals, follow similar steps. Work from right to left and regroup when needed. Place the decimal point to complete the subtraction.

First estimate and then find each sum.

1. $0.9 + 6.7$ $\begin{array}{r} 6.7 \\ \underline{+0.9} \\ 7.6 \end{array}$ Estimate $1+7=8$ Sum 7.6	2. $3.1 + 9.4$ $\begin{array}{r} 3.1 \\ \underline{+9.4} \\ 12.5 \end{array}$ Estimate $3+9=12$ Sum 12.5	3. $4.88 + 8.19$ $\begin{array}{r} 8.19 \\ \underline{+4.88} \\ 13.07 \end{array}$ Estimate $5+8=13$ Sum 13.07
--	---	---

Use mental math to find each sum.

4. $14.05 + 9.75$ <u>23.80</u>	5. $6 + 0.22 + 0.78$ <u>7</u>	6. $9.104 + 5.01 + 7.99$ <u>22.104</u>
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First estimate and then find each difference.

7. $8.5 - 4.2$ $\begin{array}{r} 8.5 \\ \underline{-4.2} \\ 4.3 \end{array}$ Estimate $9-4=5$ Difference 4.3	8. $7.2 - 3.05$ $\begin{array}{r} 7.20 \\ \underline{-3.05} \\ 4.15 \end{array}$ Estimate $7-3=4$ Difference 4.15	9. $5.07 - 2.8$ $\begin{array}{r} 5.07 \\ \underline{-2.80} \\ 2.27 \end{array}$ Estimate $5-3=2$ Difference 2.27
10. $6.347 - 2.986$ $\begin{array}{r} 6.347 \\ \underline{-2.986} \\ 3.361 \end{array}$ 3; <u>3.361</u>	11. $14.2 - 9.86$ $\begin{array}{r} 14.20 \\ \underline{-9.86} \\ 4.34 \end{array}$ 4; <u>4.34</u>	12. $13.45 - 5.001$ $\begin{array}{r} 13.450 \\ \underline{-5.001} \\ 8.449 \end{array}$ 8; <u>8.449</u>
13. $22.7 - 12.06$ $\begin{array}{r} 22.70 \\ \underline{-12.06} \\ 10.64 \end{array}$ 11; <u>10.64</u>	14. $16.1 - 10.88$ $\begin{array}{r} 16.10 \\ \underline{-10.88} \\ 5.22 \end{array}$ 5; <u>5.22</u>	15. $1.79 - 0.879$ $\begin{array}{r} 1.790 \\ \underline{-0.879} \\ 0.911 \end{array}$ 1; <u>0.911</u>

Review 8

Multiplying and Dividing Decimals by 10, 100, and 1,000

Example 1: Multiply 10×0.65 .

There is one zero in 10 so move the decimal point one place to the right.

$$10 \times 0.65 = 6.5$$

Check your answer using a paper and pencil.

$$0.65 \quad \leftarrow \quad 2 \text{ decimal places}$$

$$\times 10 \quad \leftarrow \quad 0 \text{ decimal places}$$

$$6.50 \quad \leftarrow \quad 2 \text{ decimal places}$$

$$6.50 = 6.5$$

Example 2: Divide $15.5 \div 100$.

There are two zeros in 100 so move the decimal point two places to the left.

$$15.5 \div 100 = 0.155$$

Check your answer using a paper and pencil.

$$\begin{array}{r} 0.155 \\ 100 \overline{)15.5} \\ \underline{-100} \\ 550 \\ \underline{-500} \\ 500 \\ \underline{-500} \\ 0 \end{array}$$

Use mental math to find each product.

1. 2.7×10

27

2. $2.5(10)$

25

3. $100(0.21)$

21

4. 0.77×100

77

5. $10 \times 0.2 \times 1$

2

6. $5 \times 0.2 \times 100$

100

7. 2.64×100

264

8. $7.5 \cdot 1,000$

7500

9. $0.5 \times 2 \times 20$

20

Use mental math to find each quotient.

10. $0.4 \div 10$

0.04

11. $2.3 \div 100$

0.023

12. $7 \div 100$

0.07

13. $52.3 \div 10$

5.23

14. $3 \div 1,000$

0.003

15. $41 \div 100$

0.41

Use $<$, $=$, or $>$ to complete each statement.

16. $2.2 \times 10 \quad \boxed{>} \quad 2.2(10)(0.1)$

17. $1.1 \div 10 \quad \boxed{<} \quad 110 \div 100$

18. $60 \div 100 \quad \boxed{<} \quad 600 \div 10$

19. $5 \times 0.3 \times 2 \quad \boxed{=} \quad 10 \times 0.3$

20. $0.22 \div 10 \quad \boxed{<} \quad 0.22 \div 0.1$

21. $0.004 \times 100 \quad \boxed{=} \quad 10 \times 10 \times 0.004$

22. $5.5 \times 2 \times 10 \quad \boxed{<} \quad 5.5 \times 100$

23. $(2 \times 5) 0.14 \quad \boxed{=} \quad 0.14 (10)$

Review 13

Writing Algebraic Expressions

These terms are used to describe mathematical operations.

Addition	Subtraction	Multiplication	Division
sum more than increased by total added to	difference less than fewer than decreased by	product times multiplied by	quotient of divided by

You can use the terms above to write algebraic expressions for word phrases.

Word Phrase	Algebraic Expression
the sum of m and 17	$\rightarrow m + 17$
the difference of x and 12	$\rightarrow x - 12$
3 times w	$\rightarrow 3w$
the quotient of q and 6	$\rightarrow q \div 6$

Write an expression to describe the relationship of the data in each table.

1.

n	
2	10
4	12
6	14

$n + 8$

2.

n	
1	3
2	6
3	9

$3n$

3.

n	
8	6
10	8
12	10

$n - 2$

Write an expression for each word phrase.

4. 6 increased by y
 $6 + y$

5. the quotient of 8 and e
 $8 \div e$ or $\frac{8}{e}$

6. the difference of h and 3
 $h - 3$

7. 4 times w
 $4w$

8. the difference of s and 8
 $s - 8$

9. r divided by 2
 $r \div 2$ or $\frac{r}{2}$

10. 5 more than n
 $n + 5$

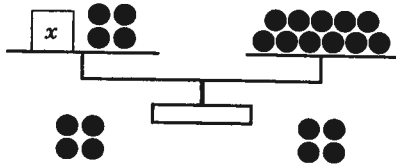
11. the product of 6 and m
 $6m$

Review 16

Solving Addition and Subtraction Equations

Addition Equations

There are 4 more than needed to fill the x box.



$$x + 4 = 11$$

To *solve* this equation, find the value of x that makes the scales balance.

Since 4 is added to x , subtract 4 from both sides.

$$\begin{aligned} x + 4 &= 11 \\ x + 4 - 4 &= 11 - 4 \\ x &= 7 \end{aligned}$$

The *solution* to the equation is $x = 7$.

Subtraction Equations

$$r - 3 = 9$$

To *solve* this equation, find the value of r .

Since 3 is subtracted from r , add 3 to both sides.

$$\begin{aligned} r - 3 &= 9 \\ r - 3 + 3 &= 9 + 3 \\ r &= 12 \end{aligned}$$

The *solution* to the equation is $r = 12$.

Solve each equation.

1. $a + 15 = 31$

$$a + 15 - \underline{15} = 31 - \underline{15}$$

$$a = \underline{16}$$

2. $5 = x - 20$

$$5 + \underline{20} = x - 20 + \underline{20}$$

$$\underline{25} = x$$

3. $19 + t = 51$
 $\underline{-19 \quad -19}$
 $\underline{t = 32}$

4. $p - 11 = 12$
 $\underline{+11 \quad +11}$
 $\underline{p = 23}$

5. $60 = n + 30$
 $\underline{-30 \quad -30}$
 $\underline{30 = n}$

6. $71 = b - 29$
 $\underline{+29 \quad +29}$
 $\underline{100 = b}$

7. $86 + m = 107$
 $\underline{-86 \quad -86}$
 $\underline{m = 21}$

8. $w + 349 = 761$
 $\underline{-349 \quad -349}$
 $\underline{w = 412}$

9. $50 - y = 30$
 $\underline{y = 20}$

10. $d - 125 = 75$
 $\underline{+125 \quad +125}$
 $\underline{d = 200}$

11. A car dealer purchased a car for \$2,000 and then sold it for \$3,200. Write and solve an equation to find the profit.

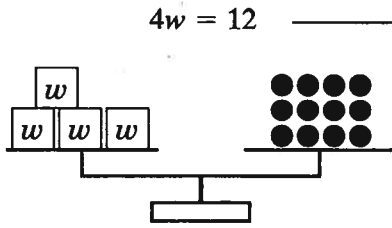
$\underline{\$1,200}$

$$\begin{aligned} y + 2000 &= 3200 \\ \underline{-2000 \quad -2000} \\ y &= 1200 \end{aligned}$$

Review 17

Solving Multiplication and Division Equations

What value of w makes the scales balance?



$4w = 12$ → To solve the multiplication sentence, use division.

$$4w = 12$$

$$4w \div 4 = 12 \div 4 \leftarrow \text{Divide both sides by 4.}$$

$$w = 3$$

The solution is $w = 3$.

To solve a division sentence, use multiplication.

$$y \div 3 = 7$$

$$y \div 3 \times 3 = 7 \times 3 \leftarrow \text{Multiply both sides by 3.}$$

$$y = 21$$

The solution is $y = 21$.

State whether the number given is a solution to the equation.

1. $3g = 36; g = 12$

yes

2. $t \div 8 = 2; t = 4$

no

3. $h \div 7 = 21; h = 3$

no

4. $18 = 3m; m = 6$

yes

5. $6a = 18; a = 3$

yes

6. $36 = r \div 9; r = 4$

no

Solve each equation.

7. $12 = 4y$

$$12 \div \underline{4} = 4y \div \underline{4}$$

$$\underline{3} = y$$

8. $n \div 9 = 4$

$$n \div 9 \times \underline{9} = 4 \times \underline{9}$$

$$n = \underline{36}$$

9. $\frac{23n}{28} = \frac{115}{33}$

$$\underline{n = 5}$$

10. $z \div 9 = 9$

$$\underline{z = 81}$$

11. $\frac{48}{12} = \frac{12h}{12}$

$$\underline{4 = h}$$

12. $\frac{10w}{10} = \frac{150}{10}$

$$\underline{w = 15}$$

13. $34 = t \div 14$

$$\begin{array}{r} 34 \\ \times 14 \\ \hline 136 \\ 340 \\ \hline 476 \end{array} \quad \underline{476 = t}$$

14. $\frac{105}{21} = \frac{21t}{21}$

$$\underline{5 = t}$$

15. $64 = e \div 9 \times 9$

$$\begin{array}{r} 64 \\ \times 9 \\ \hline 576 \end{array} = e \quad \underline{576 = e}$$

16. $\frac{8v}{8} = \frac{32}{8}$

$$\underline{v = 4}$$

17. $22 = t \div 4 \times 4$

$$\begin{array}{r} 22 \\ \times 4 \\ \hline 88 \end{array} = t \quad \underline{88 = t}$$

18. $\frac{3s}{3} = \frac{66}{3}$

$$\underline{s = 22}$$

19. $21 = b \div 2 \times 2$

$$\begin{array}{r} 21 \\ \times 2 \\ \hline 42 \end{array} = b \quad \underline{42 = b}$$

20. $\frac{15n}{15} = \frac{45}{15}$

$$\underline{n = 3}$$

Review 18

An *exponent* tells how many times a number is used as a factor.

$3 \times 3 \times 3 \times 3$ shows the number 3 is used as a factor 4 times.

$3 \times 3 \times 3 \times 3$ can be written 3^4 .

In 3^4 , 3 is the *base* and 4 is the exponent.

Read 3^4 as "three to the fourth power."

- To *simplify* a power, first write it as a product.

$$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$$

- When you simplify expressions with exponents, do all operations inside parentheses first. Then simplify the powers.

$$\begin{aligned} \text{Example: } 30 - (2 + 3)^2 &= 30 - 5^2 \\ &= 30 - 25 \\ &= 5 \end{aligned}$$

Name the base and the exponent.

1. 3^6

base 3
exponent 6

2. 6^2

base 6
exponent 2

3. 8^4

base 8
exponent 4

Write each expression using an exponent. Name the base and the exponent.

4. $9 \times 9 \times 9$

9^3 base 9
exponent 3

5. $6 \times 6 \times 6 \times 6$

6^4 base 6
exponent 4

6. $1 \times 1 \times 1 \times 1 \times 1$

1 base 1
exponent 5

Simplify each expression.

7. 6^2

36

8. 3^5

243

9. 10^4

10000

10. $4^2 + 5^2$

41
 $16 + 25$

11. $2 \times 6 - 2^3$

4

12. $6^2 + 4^2$

52
 $36 + 16$

13. $5 + 5^2 - 2$

28

14. $24 \div 4 + 2^4$

22

15. $9 + (40 \div 2^3)$

14

16. $(4^2 + 4) \div 5$

4

17. $10 \times (30 - 5^2)$

50

18. $12 + 18 \div 3^2$

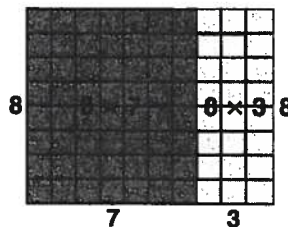
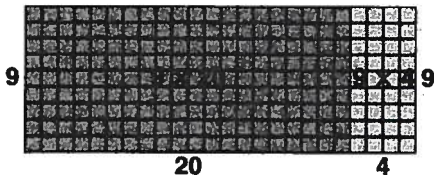
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Review 19

The Distributive Property

The *Distributive Property* allows you to break numbers apart to make mental math easier.

The Distributive Property may also help you to simplify an expression.



Multiply 9×24 mentally.

$$\begin{aligned} \text{Think: } 9 \times 24 &= 9 \times (20 + 4) \\ &= (9 \times 20) + (9 \times 4) \\ &= 180 + 36 \\ &= 216 \end{aligned}$$

$$\begin{aligned} (8 \times 7) + (8 \times 3) &= 8 \times (7 + 3) \\ &= 8 \times 10 \\ &= 80 \end{aligned}$$

Use the Distributive Property to find the missing numbers in the equation.

- $(\boxed{3}) \times 4 + (3 \times \boxed{8}) = 3 \times (4 + 8)$
- $(6 \times \boxed{5}) - (\boxed{6} \times 3) = 6 \times (5 - 3)$
- $4 \times (\boxed{9} - 3) = (\boxed{4} \times 9) - (4 \times \boxed{3})$
- $(\boxed{6} \times 7) - (6 \times \boxed{5}) = 6 \times (7 - 5)$
- $(4 \times 5) + (\boxed{4} \times 7) = 4 \times (\boxed{5} + 7)$
- $\boxed{6} \times (12 + 8) = (6 \times \boxed{12}) + (\boxed{6} \times 8)$

Use the Distributive Property to rewrite and simplify each expression.

7. $(2 \times 7) + (2 \times 5)$

2(5+7)
24

8. $8 \times (60 - 5)$

8(60) - 8(5)
440

9. $(7 \times 8) - (7 \times 6)$

7(8-6)
14

10. $(12 \times 3) + (12 \times 4)$

12(3+4)
84

Use the Distributive Property to simplify each expression.

11. 3×27 81

12. 5×43 215

13. 8×59 472

14. 7×61 427

15. 5×84 420

16. 6×53 318

17. 8×48 384

18. 4×91 364

19. 9×38 342

Review 20

Divisibility and Mental Math

A number is **divisible** by a second number if the second number divides into the first with no remainder. Here are some rules.

Last Digit of a Number	The Number Is Divisible by	Examples
any	1	any number
0, 2, 4, 6, 8	2	10; 24; 32; 54; 106; 138
0, 5	5	10; 25; 70; 915; 1,250
0	10	10; 20; 90; 500; 4,300

The Sum of the Digits	The Number Is Divisible by	Examples	
is divisible by 3	3	843 → 8 + 4 + 3 = 15 and 15 ÷ 3 = 5	$\begin{array}{r} 281 \text{ R}0 \\ 3 \overline{)843} \end{array}$
is divisible by 9	9	2,898 → 2 + 8 + 9 + 8 = 27 and 27 ÷ 9 = 3	$\begin{array}{r} 322 \text{ R}0 \\ 9 \overline{)2,898} \end{array}$

Circle the numbers that are divisible by the number at the left.

- 2 8 15 26 42 97 105 218
- 5 14 10 25 18 975 1,005 2,340
- 10 100 75 23 60 99 250 655
- 3 51 75 12 82 93 153 274
- 9 27 32 36 108 126 245 387

Use mental math to determine if the first number is divisible by the second.

- | | | |
|-------------------------|---------------------------|--------------------------|
| 6. 185; 5 <u>yes</u> | 7. 76,870; 10 <u>yes</u> | 8. 461; 1 <u>yes</u> |
| 9. 456; 3 <u>yes</u> | 10. 35,994; 2 <u>yes</u> | 11. 6,791; 3 <u>no</u> |
| 12. 12,866; 9 <u>no</u> | 13. 151,002; 9 <u>yes</u> | 14. 55,340; 5 <u>yes</u> |
| 15. 6,888; 2 <u>yes</u> | 16. 31,067; 5 <u>no</u> | 17. 901,204; 3 <u>no</u> |
| 18. 2,232; 3 <u>yes</u> | 19. 45,812; 9 <u>no</u> | 20. 3,090; 10 <u>yes</u> |
| 21. 312; 9 <u>no</u> | 22. 1,933; 3 <u>no</u> | 23. 28,889; 2 <u>no</u> |

Test each number for being divisible by 2, 5, or 10. Some numbers may be divisible by more than one number.

24. 800 2, 5, 10 25. 65 5 26. 1,010 2, 5, 10

Review 22

Greatest Common Factor

You can find the *greatest common factor (GCF)* of 12 and 18 using a division ladder, factor trees, or by listing the factors. Two of these methods are shown.

- ① List the factors of 12 and 18.

12: 1, 2, 3, 4, 6, 12
18: 1, 2, 3, 6, 9, 18

- ② Find the common factors.

12: ①, ②, ③, 4, ⑥, 12
18: ①, ②, ③, ⑥, 9, 18

The common factors are 1, 2, 3, and 6.

- ③ Name the greatest common factor: 6.

- ① Draw factor trees.



- ② Write each prime factorization. Identify common factors.

12: ② × 2 × ③
18: ② × ③ × 3

- ③ Multiply the common factors. $2 \times 3 = 6$.
The GCF of 12 and 18 is 6.

List the factors to find the GCF of each set of numbers.

- | | | |
|---|--|------------------------------|
| 1. 10: <u>1, 2, 5, 10</u> | 2. 14: <u>1, 2, 7, 14</u> | 3. 9: <u>1, 3, 3, 9</u> |
| 15: <u>1, 3, 5, 15</u> | 21: <u>1, 3, 7, 21</u> | 21: <u>1, 3, 7, 21</u> |
| GCF: <u>5</u> | GCF: <u>7</u> | GCF: <u>3</u> |
| 4. 12: <u>1, 2, 3, 4, 6, 12</u> | 5. 15: <u>1, 3, 5, 15</u> | 6. 15: <u>1, 3, 5, 15</u> |
| 13: <u>1, 13</u> | 25: <u>1, 5, 5, 25</u> | 18: <u>1, 2, 3, 6, 9, 18</u> |
| GCF: <u>1</u> | GCF: <u>5</u> | GCF: <u>3</u> |
| 7. 36: <u>1, 2, 3, 4, 6, 9, 12, 18, 36</u> | 8. 24: <u>1, 2, 3, 4, 6, 8, 12, 24</u> | |
| 48: <u>1, 2, 3, 4, 6, 8, 12, 16, 24, 48</u> | 30: <u>1, 2, 3, 5, 6, 10, 15, 30</u> | |
| GCF: <u>12</u> | GCF: <u>6</u> | |

Find the GCF of each set of numbers.

- | | | |
|---------------------|----------------------|-----------------------|
| 9. 21, 60 <u>3</u> | 10. 15, 45 <u>15</u> | 11. 32, 40 <u>8</u> |
| 12. 54, 60 <u>6</u> | 13. 20, 50 <u>10</u> | 14. 21, 63 <u>21</u> |
| 15. 36, 40 <u>4</u> | 16. 48, 72 <u>24</u> | 17. 90, 150 <u>30</u> |

Review 23

Equivalent Fractions

Equivalent fractions are fractions that name the same amount.

To find equivalent fractions, multiply or divide the numerator and denominator by the same number.

$$\frac{2}{5} = \frac{4}{10}$$

(Arrows show 2 → 4 via × 2 and 5 → 10 via × 2)

$$\frac{4}{10} = \frac{2}{5}$$

(Arrows show 4 → 2 via ÷ 2 and 10 → 5 via ÷ 2)

So, $\frac{2}{5} = \frac{4}{10}$.

To write a fraction in *simplest form*, divide the numerator and denominator by their greatest common factor.

Example: Write $\frac{8}{12}$ in simplest form.

- ① Find the greatest common factor.

8: 1, 2, 4, 8

12: 1, 2, 3, 4, 6, 12

The GCF is 4.

- ② Divide the numerator and denominator by the GCF.

$$\frac{8}{12} = \frac{2}{3}$$

(Arrows show 8 → 2 via ÷ 4 and 12 → 3 via ÷ 4)

$\frac{8}{12}$ in simplest form is $\frac{2}{3}$.

Write two fractions equivalent to each fraction.

1. $\frac{5}{6}$ $\frac{10}{12}, \frac{15}{18}$

2. $\frac{3}{7}$ $\frac{6}{14}, \frac{9}{21}$

3. $\frac{7}{8}$ $\frac{14}{16}, \frac{21}{24}$

4. $\frac{3}{11}$ $\frac{6}{22}, \frac{9}{33}$

5. $\frac{3}{6}$ $\frac{1}{2}, \frac{9}{18}$

6. $\frac{1}{5}$ $\frac{2}{10}, \frac{3}{15}$

State whether each fraction is in simplest form. If it is not, write it in simplest form.

7. $\frac{12}{15}$ $\frac{4}{5}$

8. $\frac{8}{15}$ simplest form

9. $\frac{9}{21}$ $\frac{3}{7}$

10. $\frac{15}{22}$ Simplest form

11. $\frac{14}{30}$ $\frac{7}{15}$

12. $\frac{25}{70}$ $\frac{5}{14}$

Write each fraction in simplest form.

13. $\frac{12}{24}$ $\frac{1}{2}$

14. $\frac{10}{200}$ $\frac{1}{20}$

15. $\frac{56}{64}$ $\frac{7}{8}$

16. $\frac{3}{9}$ $\frac{1}{3}$

17. $\frac{130}{170}$ $\frac{13}{17}$

18. $\frac{12}{16}$ $\frac{3}{4}$

19. $\frac{7}{49}$ $\frac{1}{7}$

20. $\frac{22}{33}$ $\frac{2}{3}$

21. $\frac{30}{225}$ $\frac{2}{15}$

22. There are 420 girls out of 1,980 people attending a state fair. In simplest form, what fraction of the people attending are girls?

$\frac{420}{1980} = \frac{7}{33}$

Review 24

Mixed Numbers and Improper Fractions

To write a mixed number as an *improper fraction*:

- ① Multiply the whole number by the denominator.
- ② Add this product to the numerator.
- ③ Write this sum over the denominator.

$$\begin{array}{l} \textcircled{2} \quad \textcircled{3} \\ \textcircled{1} \end{array} \quad \frac{35}{8} = \frac{29}{8}$$

To write an improper fraction as a *mixed number*:

- ① Divide the numerator by the denominator.
- ② Write the remainder over the denominator.
- ③ Simplify, if possible.

$$\frac{20}{8} = 2 \text{ remainder } 4$$

$$= 2\frac{4}{8}$$

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

$$\frac{20}{8} = 2\frac{1}{2}$$

Write each mixed number as an improper fraction.

- | | | |
|-----------------------------------|------------------------------------|-----------------------------------|
| 1. $2\frac{2}{7} = \frac{16}{7}$ | 2. $5\frac{3}{4} = \frac{23}{4}$ | 3. $6\frac{1}{2} = \frac{13}{2}$ |
| 4. $6\frac{5}{8} = \frac{53}{8}$ | 5. $3\frac{4}{10} = \frac{34}{10}$ | 6. $4\frac{3}{5} = \frac{23}{5}$ |
| 7. $9\frac{1}{3} = \frac{28}{3}$ | 8. $4\frac{4}{5} = \frac{24}{5}$ | 9. $1\frac{7}{8} = \frac{15}{8}$ |
| 10. $3\frac{3}{8} = \frac{27}{8}$ | 11. $2\frac{3}{7} = \frac{17}{7}$ | 12. $8\frac{1}{6} = \frac{49}{6}$ |

On a separate sheet of paper, draw a model of a 4-inch ruler marked off in eighths. Find and label each measurement on your ruler.

- | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|
| 13. $3\frac{5}{8}$ | 14. $2\frac{6}{8}$ | 15. $3\frac{1}{2} = 3\frac{4}{8}$ |
| 16. $1\frac{3}{4} = 1\frac{6}{8}$ | 17. $2\frac{1}{2} = 2\frac{4}{8}$ | 18. $3\frac{1}{4} = 3\frac{2}{8}$ |

Write each improper fraction as a mixed number in simplest form.

- | | | |
|-----------------------------------|--|--|
| 19. $\frac{9}{8} = 1\frac{1}{8}$ | 20. $\frac{7}{2} = 3\frac{1}{2}$ | 21. $\frac{12}{5} = 2\frac{2}{5}$ |
| 22. $\frac{8}{3} = 2\frac{2}{3}$ | 23. $\frac{14}{8} = 1\frac{6}{8} = 1\frac{3}{4}$ | 24. $\frac{6}{5} = 1\frac{1}{5}$ |
| 25. $\frac{20}{3} = 6\frac{2}{3}$ | 26. $\frac{17}{5} = 3\frac{2}{5}$ | 27. $\frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$ |
| 28. $\frac{9}{5} = 1\frac{4}{5}$ | 29. $\frac{29}{8} = 3\frac{5}{8}$ | 30. $\frac{24}{9} = 2\frac{6}{9} = 2\frac{2}{3}$ |

Review 25

Least Common Multiple

Find the *least common multiple (LCM)* of 8 and 12.

- ① Begin listing multiples of each number.

8: 8, 16, 24, 32, 40

12: 12, 24

- ② Continue the lists until you find the first multiple that is common to both lists. That is the LCM.

The least common multiple of 8 and 12 is 24.

List multiples to find the LCM of each pair of numbers.

1. 4: 4, 8, 12, 16, 20

5: 5, 10, 15, 20

LCM: 20

2. 6: 6, 12, 18, 24, 30, 36, 42

7: 7, 14, 21, 28, 35, 42

LCM: 42

3. 9: 9, 18, 27, 36, 45

15: 15, 30, 45

LCM: 45

4. 10: 10, 20, 30, 40, 50

25: 25, 50

LCM: 50

5. 8: 8, 16, 24

24: 24

LCM: 24

6. 8: 8, 16, 24, 32

12: 12, 24

LCM: 24

7. 4: 4, 8, 12, 16, 20, 24, 28

7: 7, 14, 21, 28

LCM: 28

8. 15: 15, 30, 45, 60, 75

25: 25, 50, 75

LCM: 75

9. 15: 15, 30, 45, 60

20: 20, 40, 60

LCM: 60

10. 4: 4, 8, 12, 16, 20, 24, 28, 32, 36

9: 9, 18, 27, 36

LCM: 36

Use prime factorization to find the LCM of each set of numbers.

11. 9, 21 63

12. 6, 8 24

13. 18, 24 72

14. 40, 50 200

15. 42, 49 294

16. 6, 12 12

Review 26

Comparing and Ordering Fractions

To compare and order fractions, use the *least common denominator (LCD)*.
The LCD is the least common multiple (LCM) of the original denominators.

Compare Fractions

Example 1: Compare $\frac{3}{4}$ and $\frac{7}{10}$.

- ① Find the LCD of the denominators 4 and 10:

$$4 = 2 \times 2$$

$$10 = 2 \times 5$$

$$\text{LCD} = 2 \times 2 \times 5 = 20$$

- ② Write equivalent fractions:

$$\frac{3}{4} \xrightarrow{\times 5} \frac{15}{20}$$

$$\frac{7}{10} \xrightarrow{\times 2} \frac{14}{20}$$

- ③ Compare: $\frac{15}{20} > \frac{14}{20}$, or
 $\frac{3}{4} > \frac{7}{10}$

Order Fractions

Example 2: Order from least to greatest: $\frac{2}{3}, \frac{5}{8}, \frac{3}{4}$.

- ① Find the LCD of the denominators 3, 8, and 4:

$$3 = 3$$

$$8 = 2 \times 2 \times 2$$

$$4 = 2 \times 2$$

$$\text{LCD} = 2 \times 2 \times 2 \times 3 = 24$$

- ② Write equivalent fractions:

$$\frac{2}{3} \xrightarrow{\times 8} \frac{16}{24}$$

$$\frac{5}{8} \xrightarrow{\times 3} \frac{15}{24}$$

$$\frac{3}{4} \xrightarrow{\times 6} \frac{18}{24}$$

- ③ Order:
15, 16, 18
 $\frac{15}{24} < \frac{16}{24} < \frac{18}{24}$, or $\frac{5}{8} < \frac{2}{3} < \frac{3}{4}$

Compare each pair of numbers using $<$, $=$, or $>$.

- | | | |
|---------------------------------------|--|---|
| 1. $\frac{2}{9} \square \frac{1}{3}$ | 2. $\frac{5}{6} \square \frac{7}{8}$ | 3. $\frac{7}{20} \square \frac{3}{10}$ |
| 4. $\frac{3}{6} \square \frac{4}{11}$ | 5. $\frac{2}{3} \square \frac{4}{6}$ | 6. $\frac{4}{8} \square \frac{2}{8}$ |
| 7. $\frac{3}{7} \square \frac{5}{8}$ | 8. $\frac{1}{3} \square \frac{3}{9}$ | 9. $\frac{1}{2} \square \frac{3}{7}$ |
| 10. $\frac{4}{5} \square \frac{7}{9}$ | 11. $\frac{2}{3} \square \frac{7}{10}$ | 12. $2\frac{5}{9} \square 2\frac{3}{5}$ |

Order each set of numbers from least to greatest.

- | | | |
|---|---|---|
| 13. $\frac{3}{4}, \frac{5}{8}, \frac{1}{2}$ <u>$\frac{1}{2}, \frac{5}{8}, \frac{3}{4}$</u> | 14. $\frac{5}{8}, \frac{5}{6}, \frac{2}{3}$ <u>$\frac{5}{8}, \frac{2}{3}, \frac{5}{6}$</u> | 15. $\frac{1}{2}, \frac{5}{12}, \frac{2}{3}$ <u>$\frac{5}{12}, \frac{1}{2}, \frac{2}{3}$</u> |
| 16. $\frac{3}{5}, \frac{2}{3}, \frac{7}{12}$ <u>$\frac{7}{12}, \frac{2}{3}, \frac{3}{5}$</u> | 17. $\frac{1}{2}, \frac{3}{5}, \frac{3}{8}$ <u>$\frac{3}{8}, \frac{1}{2}, \frac{3}{5}$</u> | 18. $\frac{7}{8}, \frac{3}{4}, \frac{13}{16}$ <u>$\frac{3}{4}, \frac{13}{16}, \frac{7}{8}$</u> |

19. Suzanne swims $1\frac{1}{9}$ miles. Eugene swims $1\frac{5}{12}$ miles. Who swims farther? Show your work.

Eugene swims farther.

Review 27

Fractions and Decimals

Example 1: Write 0.320 as a fraction in simplest form.

- ① Read. "320 thousandths"
- ② Write. $\frac{320}{1,000}$
- ③ Simplify. $\frac{320}{1,000} = \frac{320 \div 40}{1,000 \div 40} = \frac{8}{25}$
 $0.320 = \frac{8}{25}$

Example 2: Write 6.95 as a mixed number in simplest form.

- ① Read. "6 and 95 hundredths"
- ② Write. $6\frac{95}{100}$
- ③ Simplify. $6\frac{95}{100} = 6\frac{19}{20}$
 $6.95 = 6\frac{19}{20}$

Example 3: Write $\frac{1}{5}$ and $\frac{2}{3}$ as decimals.

Divide the numerator by the denominator. Insert zeros if needed.

$\begin{array}{r} 0.2 \\ 5 \overline{)1.0} \end{array}$	$\begin{array}{r} 0.666 \dots \\ 3 \overline{)2.0000} \\ \underline{-18} \\ 20 \\ \underline{-18} \\ 2 \end{array}$	← The digits repeat because the remainder repeats.
---	---	--

$\frac{1}{5} = 0.2$ $\frac{2}{3} = 0.666 \dots = 0.\overline{6}$

0.2 is a *terminating decimal* because there is no remainder.

0.666 ... is a *repeating decimal* because the remainder repeats. Write it as $0.\overline{6}$.

Write each decimal as a fraction or mixed number in simplest form.

- | | | |
|--|---|---|
| 1. 0.8 $\frac{8}{10} = \frac{4}{5}$ | 2. 0.55 $\frac{55}{100} = \frac{11}{20}$ | 3. 1.25 $1\frac{1}{4}$ |
| 4. 1.75 $1\frac{3}{4}$ | 5. 3.375 $3\frac{375}{1000} = 3\frac{3}{8}$ | 6. 0.125 $\frac{1}{8}$ |
| 7. 1.32 $1\frac{32}{100} = 1\frac{8}{25}$ | 8. 0.34 $\frac{34}{100} = \frac{17}{50}$ | 9. 0.084 $\frac{84}{1000} = \frac{21}{250}$ |
| 10. 0.006 $\frac{6}{1000} = \frac{3}{500}$ | 11. 0.65 $\frac{65}{100} = \frac{13}{20}$ | 12. 4.95 $4\frac{95}{100} = 4\frac{19}{20}$ |

Write each fraction or mixed number as a decimal.

- | | | |
|--------------------------------------|-------------------------------------|---------------------------------------|
| 13. $\frac{13}{20}$ 0.65 | 14. $\frac{1}{6}$ $0.1\overline{6}$ | 15. $\frac{7}{20}$ 0.35 |
| 16. $2\frac{3}{5}$ 2.6 | 17. $\frac{19}{25}$ 0.76 | 18. $\frac{4}{9}$ $0.\overline{4}$ |
| 19. $\frac{7}{11}$ $0.\overline{63}$ | 20. $1\frac{5}{8}$ 1.625 | 21. $1\frac{2}{9}$ $1.\overline{2}$ |
| 22. $2\frac{2}{8}$ 2.25 | 23. $\frac{1}{25}$ 0.04 | 24. $\frac{5}{12}$ $0.41\overline{6}$ |

State whether each fraction is less than, equal to, or greater than 0.50.

Show your work.

- | | | |
|---|--|--|
| 25. $\frac{1}{3}$ $0.\overline{3}$ less | 26. $\frac{20}{40}$ 0.5 equal | 27. $\frac{1}{6}$ $0.1\overline{6}$ less |
| 28. $\frac{7}{8}$ 0.875 more | 29. $\frac{11}{13}$ $0.8\overline{5}$ more | 30. $\frac{8}{20}$ 0.4 less |

Review 30

Fractions With Like Denominators

Add: $\frac{1}{6} + \frac{3}{6}$

- ① Combine numerators over the denominator.

$$\frac{1}{6} + \frac{3}{6} = \frac{1+3}{6}$$

- ② Add numerators.

$$= \frac{4}{6}$$

- ③ Simplify, if possible.

$$= \frac{2}{3}$$

$$\frac{1}{6} + \frac{3}{6} = \frac{2}{3}$$

Subtract: $\frac{7}{10} - \frac{2}{10}$

- ① Combine numerators over the denominator.

$$\frac{7}{10} - \frac{2}{10} = \frac{7-2}{10}$$

- ② Subtract numerators.

$$= \frac{5}{10}$$

- ③ Simplify, if possible.

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

$$\frac{7}{10} - \frac{2}{10} = \frac{1}{2}$$

Find each sum.

1. $\frac{1}{5} + \frac{3}{5} = \frac{4}{5}$

2. $\frac{4}{6} + \frac{1}{6} = \frac{5}{6}$

3. $\frac{3}{12} + \frac{3}{12} = \frac{6}{12} = \frac{1}{2}$

4. $\frac{6}{10} + \frac{5}{10} = \frac{11}{10} = 1\frac{1}{10}$

5. $\frac{3}{10} + \frac{2}{10} = \frac{5}{10} = \frac{1}{2}$

6. $\frac{6}{12} + \frac{3}{12} = \frac{9}{12} = \frac{3}{4}$

7. $\frac{5}{8} + \frac{1}{8} = \frac{6}{8} = \frac{3}{4}$

8. $\frac{3}{8} + \frac{9}{8} = \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2}$

9. $\frac{3}{8} + \frac{6}{8} = \frac{9}{8} = 1\frac{1}{8}$

Find each difference.

10. $\frac{6}{8} - \frac{3}{8} = \frac{3}{8}$

11. $\frac{9}{10} - \frac{3}{10} = \frac{6}{10} = \frac{3}{5}$

12. $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

13. $\frac{7}{12} - \frac{1}{12} = \frac{6}{12} = \frac{1}{2}$

14. $\frac{8}{10} - \frac{6}{10} = \frac{2}{10} = \frac{1}{5}$

15. $\frac{4}{6} - \frac{2}{6} = \frac{2}{6} = \frac{1}{3}$

16. $\frac{5}{10} - \frac{1}{10} = \frac{4}{10} = \frac{2}{5}$

17. $\frac{7}{12} - \frac{6}{12} = \frac{1}{12}$

18. $\frac{9}{10} - \frac{4}{10} = \frac{5}{10} = \frac{1}{2}$

Find each sum or difference.

19. $\frac{2}{7} + \frac{2}{7} - \frac{1}{7} = \frac{4}{7} - \frac{1}{7} = \frac{3}{7}$

20. $\frac{10}{100} + \frac{20}{100} + \frac{90}{100} = \frac{120}{100} = \frac{6}{5} = 1\frac{1}{5}$

21. $\frac{2}{5} - \frac{2}{5} + \frac{5}{5} = \frac{5}{5} = 1$

22. $\frac{10}{11} - (\frac{2}{11} + \frac{4}{11}) = \frac{10}{11} - \frac{6}{11} = \frac{4}{11}$

23. $\frac{8}{10} - \frac{2}{10} - \frac{1}{10} = \frac{6}{10} - \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$

24. $\frac{62}{80} - \frac{10}{80} - \frac{5}{80} = \frac{52}{80} - \frac{5}{80} = \frac{47}{80}$

25. For school photos, $\frac{1}{5}$ of the students choose to have a blue background, $\frac{2}{5}$ of the students choose to have a purple background, and $\frac{1}{5}$ of the students choose to have a gray background. What portion of the students choose to have another background color?

$\frac{1}{5}$ of the students choose another color.

$$\frac{1}{5} + \frac{2}{5} + \frac{1}{5} = \frac{4}{5}$$

$$\frac{5}{5} - \frac{4}{5} = \frac{1}{5}$$

Review 31

Fractions With Unlike Denominators

To add or subtract fractions with unlike denominators, you can use equivalent fractions.

Find $\frac{5}{6} + \frac{1}{2}$.

- ① Find the least common denominator of 6 and 2.

The LCD is 6.

- ② Write equivalent fractions using the LCD.

$$\frac{5}{6} = \frac{5}{6} \quad \frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$$

- ③ Add. Write the sum in simplest form.

$$\begin{aligned} \frac{5}{6} + \frac{1}{2} &= \frac{5}{6} + \frac{3}{6} \\ &= \frac{5+3}{6} \\ &= \frac{8}{6} \\ &= \frac{4}{3} \\ &= 1\frac{1}{3} \end{aligned}$$

$$\frac{5}{6} + \frac{1}{2} = 1\frac{1}{3}$$

Find $\frac{4}{5} - \frac{1}{3}$.

- ① Find the least common denominator of 5 and 3.

The LCD is 15.

- ② Write equivalent fractions using the LCD.

$$\frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15} \quad \frac{1}{3} = \frac{1 \times 5}{3 \times 5} = \frac{5}{15}$$

- ③ Subtract. Write the difference in simplest form.

$$\begin{aligned} \frac{4}{5} - \frac{1}{3} &= \frac{12}{15} - \frac{5}{15} \\ &= \frac{12-5}{15} \\ &= \frac{7}{15} \end{aligned}$$

$$\frac{4}{5} - \frac{1}{3} = \frac{7}{15}$$

Find each sum or difference.

1. $\frac{1}{2} + \frac{3}{4} = \frac{5}{4} = 1\frac{1}{4}$

4. $\frac{7}{8} - \frac{1}{2} = \frac{3}{8}$

7. $\frac{1}{2} + \frac{7}{10} = \frac{12}{10} = 1\frac{1}{5}$

10. $\frac{15}{16} - \frac{1}{4} = \frac{11}{16}$

13. $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$

16. $\frac{7}{8} - \frac{3}{10} = \frac{23}{40}$

19. $\frac{5}{8} + \frac{2}{3} = \frac{31}{24} = 1\frac{7}{24}$

22. $\frac{7}{10} - \frac{3}{5} = \frac{1}{10}$

2. $\frac{11}{16} - \frac{5}{16} = \frac{6}{16} = \frac{3}{8}$

5. $\frac{9}{10} + \frac{1}{2} = \frac{14}{10} = 1\frac{2}{5}$

8. $\frac{3}{4} - \frac{5}{12} = \frac{4}{12} = \frac{1}{3}$

11. $\frac{7}{12} - \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$

14. $\frac{3}{5} + \frac{1}{6} = \frac{23}{30}$

17. $\frac{2}{6} + \frac{3}{4} = \frac{13}{12} = 1\frac{1}{12}$

20. $\frac{3}{5} - \frac{1}{2} = \frac{1}{10}$

23. $\frac{9}{10} - \frac{1}{2} = \frac{4}{10} = \frac{2}{5}$

3. $\frac{1}{6} + \frac{1}{3} = \frac{3}{6} = \frac{1}{2}$

6. $\frac{2}{3} + \frac{5}{9} = \frac{11}{9} = 1\frac{2}{9}$

9. $\frac{5}{8} + \frac{1}{4} = \frac{7}{8}$

12. $\frac{5}{6} + \frac{1}{3} = \frac{7}{6} = 1\frac{1}{6}$

15. $\frac{1}{12} + \frac{1}{10} = \frac{11}{60}$

18. $\frac{3}{8} - \frac{1}{3} = \frac{1}{24}$

21. $\frac{1}{8} + \frac{1}{5} = \frac{13}{40}$

24. $\frac{1}{10} + \frac{4}{5} = \frac{9}{10}$

Review 32

Adding Mixed Numbers

Some mixed numbers can be added mentally.

Find $5\frac{1}{4} + 2\frac{1}{8}$.

- ① Add the whole numbers.

$$5 + 2 = 7$$

- ② Add the fractions.

$$\frac{1}{4} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

- ③ Combine the two parts.

$$7 + \frac{3}{8} = 7\frac{3}{8}$$

$$5\frac{1}{4} + 2\frac{1}{8} = 7\frac{3}{8}$$

Or, you can follow these steps.

Find $4\frac{4}{5} + 2\frac{9}{10}$.

- ① Write with a common denominator.

$$4\frac{4}{5} + 2\frac{9}{10} = 4\frac{8}{10} + 2\frac{9}{10}$$

- ② Add the whole numbers. $= 6\frac{17}{10}$

Add the fractions.

- ③ Rename $6\frac{17}{10}$ as $7\frac{7}{10}$. $= 7\frac{7}{10}$

$$4\frac{4}{5} + 2\frac{9}{10} = 7\frac{7}{10}$$

Find each sum.

1. $4\frac{4}{7} + 1\frac{1}{7}$

$$5\frac{5}{7}$$

2. $1\frac{1}{3} + 3\frac{1}{3}$

$$4\frac{2}{3}$$

3. $2\frac{1}{2} + 4$

$$6\frac{1}{2}$$

4. $8\frac{2}{5} + 4\frac{1}{10}$

$$12\frac{5}{10} = 12\frac{1}{2}$$

5. $7\frac{3}{4} + 2\frac{1}{8}$

$$9\frac{7}{8}$$

6. $2\frac{7}{10} + 3\frac{1}{5}$

$$5\frac{9}{10}$$

7. $7\frac{2}{9} + 1\frac{4}{9}$

$$8\frac{6}{9} = 8\frac{2}{3}$$

8. $8\frac{3}{14} + 2\frac{1}{7}$

$$10\frac{5}{14}$$

9. $9\frac{3}{8} + 2\frac{1}{2}$

$$11\frac{7}{8}$$

10. $1\frac{3}{4} + 4\frac{7}{8}$

$$5\frac{13}{8} = 6\frac{5}{8}$$

11. $7\frac{2}{3} + 8\frac{5}{6}$

$$15\frac{9}{6} = 16\frac{1}{2}$$

12. $1\frac{2}{5} + 9\frac{2}{5}$

$$10\frac{16}{5} = 11\frac{1}{5}$$

13. $6\frac{3}{4} + 8\frac{4}{5}$

$$14\frac{31}{20} = 15\frac{11}{20}$$

14. $3\frac{2}{3} + 5\frac{5}{6}$

$$8\frac{9}{6} = 9\frac{1}{2}$$

15. $4\frac{2}{5} + 6\frac{7}{10}$

$$10\frac{11}{10} = 11\frac{1}{10}$$

16. $6 + 3\frac{2}{5}$

$$9\frac{2}{5}$$

17. $9\frac{1}{6} + 1\frac{1}{3}$

$$10\frac{3}{6} = 10\frac{1}{2}$$

18. $8\frac{1}{16} + 4\frac{5}{8}$

$$12\frac{11}{16}$$

Review 33

Subtracting Mixed Numbers

Some mixed numbers can be subtracted mentally.

Find $5\frac{2}{3} - 2\frac{1}{6}$.

- ① Subtract the whole numbers.

$$5 - 2 = 3$$

- ② Then, subtract the fractions.

$$\frac{2}{3} - \frac{1}{6} = \frac{4}{6} - \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

- ③ Combine the two parts.

$$3 + \frac{1}{2} = 3\frac{1}{2}$$

$$5\frac{2}{3} - 2\frac{1}{6} = 3\frac{1}{2}$$

Sometimes you must rename the first fraction before subtracting.

Find $6\frac{1}{2} - 2\frac{3}{4}$.

Cannot subtract
 $\frac{1}{2} - \frac{3}{4}$

- ① Write with a common denominator.

$$6\frac{1}{2} - 2\frac{3}{4} = 6\frac{2}{4} - 2\frac{3}{4}$$

- ② Rename $6\frac{2}{4}$. $= 5\frac{6}{4} - 2\frac{3}{4}$

- ③ Subtract the whole numbers. $= 3\frac{3}{4}$

Then, subtract the fractions.
Simplify, if necessary.

$$6\frac{1}{2} - 2\frac{3}{4} = 3\frac{3}{4}$$

Find each difference.

1. $7\frac{7}{10} - 2\frac{3}{10}$

$$5\frac{4}{10} = 5\frac{2}{5}$$

2. $3\frac{3}{4} - 1\frac{1}{2}$

$$2\frac{1}{4}$$

3. $6\frac{2}{3} - 2\frac{1}{6}$

$$4\frac{1}{2}$$

4. $9\frac{7}{8} - 7\frac{3}{4}$

$$2\frac{1}{8}$$

5. $8\frac{1}{2} - 3\frac{1}{4}$

$$5\frac{1}{4}$$

6. $14\frac{1}{3} - 8\frac{1}{4}$

$$6\frac{1}{12}$$

$$14\frac{4}{12} - 8\frac{3}{12}$$

7. $12\frac{1}{3} - 9\frac{2}{3}$

$$2\frac{2}{3}$$

$$11\frac{4}{3} - 9\frac{2}{3}$$

8. $6\frac{5}{8} - 2\frac{3}{4}$

$$3\frac{7}{8}$$

$$5\frac{13}{8} - 2\frac{6}{8}$$

9. $7\frac{5}{7} - 4\frac{13}{14}$

$$2\frac{11}{14}$$

$$6\frac{24}{14} - 4\frac{13}{14}$$

10. $10\frac{2}{3} - 7\frac{5}{6}$

$$2\frac{5}{6}$$

$$9\frac{10}{6} - 7\frac{5}{6}$$

11. $5\frac{7}{16} - 1\frac{1}{2}$

$$3\frac{15}{16}$$

$$4\frac{23}{16} - 1\frac{8}{16}$$

12. $8\frac{2}{5} - 3\frac{2}{3}$

$$4\frac{11}{15}$$

$$8\frac{6}{15} - 3\frac{10}{15} = 7\frac{21}{15} - 3\frac{10}{15}$$

13. $6\frac{1}{8} - 3\frac{1}{16}$

$$3\frac{1}{16}$$

$$6\frac{2}{16} - 3\frac{1}{16}$$

14. $9\frac{5}{12} - 5\frac{3}{4}$

$$3\frac{8}{12} = 3\frac{2}{3}$$

$$8\frac{17}{12} - 5\frac{9}{12}$$

15. $12\frac{3}{4} - 6\frac{1}{8}$

$$6\frac{5}{8}$$

16. $7\frac{2}{5} - 2\frac{1}{4}$

$$5\frac{3}{20}$$

$$7\frac{8}{20} - 2\frac{5}{20}$$

17. $15\frac{5}{12} - 8\frac{1}{3}$

$$7\frac{1}{12}$$

18. $4\frac{1}{10} - 2\frac{4}{5}$

$$1\frac{3}{10}$$

$$3\frac{11}{10} - 2\frac{8}{10}$$

Review 37

Multiplying Fractions

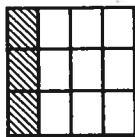
You can model $\frac{2}{3}$ of $\frac{1}{4}$.

① Show $\frac{1}{4}$.

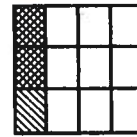


$$\frac{2}{3} \text{ of } \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$$

② Divide into thirds.



③ Shade $\frac{2}{3}$ of the $\frac{1}{4}$.

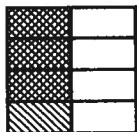


Or you can use multiplication.

$$\begin{aligned} \frac{2}{3} \text{ of } \frac{1}{4} &= \frac{2}{3} \times \frac{1}{4} \\ &= \frac{2 \times 1}{3 \times 4} \\ &= \frac{2}{12} \\ &= \frac{1}{6} \end{aligned}$$

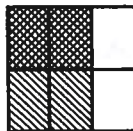
Write the multiplication problem each model represents.

1.



$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

2.



$$\frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$$

Find each product.

3. $\frac{1}{9}$ of $\frac{2}{3}$

$$\frac{1}{9} \times \frac{2}{3} = \frac{2}{27}$$

4. $\frac{2}{7} \times \frac{1}{2}$

$$\frac{1}{7}$$

5. $\frac{5}{8} \cdot \frac{6}{4}$

$$\frac{15}{4} = 3\frac{3}{4}$$

6. $\frac{3}{4} \cdot \frac{4}{7}$

$$\frac{3}{7}$$

7. $\frac{7}{10}$ of $\frac{1}{3}$

$$\frac{7}{30}$$

8. $\frac{5}{8} \times \frac{3}{4}$

$$\frac{5}{8}$$

9. $\frac{3}{8}$ of $\frac{7}{10}$

$$\frac{21}{80}$$

10. $\frac{3}{4} \times \frac{1}{3}$

$$\frac{1}{4}$$

11. $\frac{2}{9}$ of 8

$$\frac{2}{9} \times \frac{8}{1} = \frac{16}{9}$$

$$1\frac{7}{9}$$

12. $\frac{1}{3}$ of 2

$$\frac{1}{3} \times \frac{2}{1}$$

$$\frac{2}{3}$$

13. $\frac{5}{9}$ of 4

$$\frac{5}{9} \times \frac{4}{1} = \frac{20}{9}$$

$$2\frac{2}{9}$$

14. $\frac{3}{4} \cdot \frac{2}{5}$

$$\frac{3}{10}$$

15. Every day you eat $\frac{1}{4}$ cup of cereal. Your brother eats 5 times as much. How many cups of cereal does your brother eat?

$$\frac{1}{4} \times \frac{5}{1} = \frac{5}{4} = 1\frac{1}{4} \text{ cups}$$

Multiplying Mixed Numbers

Review 38

Example 1: Multiply:

① Change to improper fractions.

② Simplify.

③ Multiply.

④ Simplify.

$$2\frac{1}{7} \times 2\frac{2}{5}$$

$$\frac{15}{7} \times \frac{12}{5}$$

$$3\frac{15}{7} \times \frac{12}{8}_1$$

$$\frac{36}{7} \leftarrow \frac{3 \times 12}{7 \leftarrow 7 \times 1}$$

$$5\frac{1}{7}$$

$$2\frac{1}{7} \times 2\frac{2}{5} = 5\frac{1}{7}$$

Example 2: Multiply: $\frac{2}{3} \times 5\frac{1}{4}$

$$\frac{2}{3} \times \frac{21}{4}$$

$$1\frac{2}{3} \times \frac{21}{4}_2$$

$$\frac{7}{2} \leftarrow \frac{1 \times 7}{2 \leftarrow 1 \times 2}$$

$$3\frac{1}{2}$$

$$\frac{2}{3} \times 5\frac{1}{4} = 3\frac{1}{2}$$

Find each product.

1. $1\frac{1}{4} \times 2\frac{2}{3}$
 $\frac{5}{4} \times \frac{8}{3} = \frac{10}{3} = 3\frac{1}{3}$

2. $2\frac{2}{5} \times 4\frac{1}{2}$
 $6\frac{12}{5} \times \frac{9}{2} = \frac{54}{5} = 10\frac{4}{5}$

3. $3\frac{1}{7} \times 2\frac{4}{5}$
 $\frac{22}{7} \times \frac{14}{5} = \frac{44}{5} = 8\frac{4}{5}$

4. $\frac{1}{5} \times 2\frac{7}{9}$
 $\frac{1}{5} \times \frac{20}{9} = \frac{20}{45} = \frac{4}{9}$

5. $12\frac{1}{2} \times 2\frac{2}{5}$
 $5\frac{25}{2} \times \frac{12}{5} = 30$

6. $2\frac{1}{8} \times 2\frac{2}{3}$
 $1\frac{1}{8} \times \frac{8}{3} = \frac{17}{3} = 5\frac{2}{3}$

7. $5\frac{1}{3} \times 1\frac{7}{8}$
 $2\frac{16}{3} \times \frac{15}{8} = \frac{155}{10} = 15\frac{5}{10} = 15\frac{1}{2}$

8. $\frac{1}{2} \times 3\frac{3}{5}$
 $\frac{1}{2} \times \frac{18}{5} = \frac{9}{5} = 1\frac{4}{5}$

9. $2\frac{1}{7} \times 4\frac{2}{3}$
 $5\frac{15}{7} \times \frac{14}{3} = \frac{140}{3} = 46\frac{2}{3}$

10. $1\frac{1}{2} \times 2\frac{6}{7}$
 $\frac{3}{2} \times \frac{20}{7} = \frac{30}{7} = 4\frac{2}{7}$

11. $1\frac{5}{6} \times 2\frac{1}{4}$
 $\frac{11}{6} \times \frac{9}{4} = \frac{33}{8} = 4\frac{1}{8}$

12. $5\frac{1}{4} \times 2\frac{2}{7}$
 $3\frac{21}{4} \times \frac{14}{7} = \frac{147}{2} = 73\frac{1}{2}$

13. $\frac{1}{4} \times 1\frac{3}{5}$
 $\frac{1}{4} \times \frac{8}{5} = \frac{2}{5}$

14. $\frac{1}{7} \times 1\frac{3}{4}$
 $\frac{1}{7} \times \frac{7}{4} = \frac{1}{4}$

15. $\frac{2}{9} \times 2\frac{1}{4}$
 $\frac{2}{9} \times \frac{5}{4} = \frac{10}{36} = \frac{5}{18}$

16. $3\frac{1}{3} \times 3\frac{3}{10}$
 $\frac{16}{3} \times \frac{33}{10} = \frac{176}{10} = 17\frac{4}{5}$

17. $1\frac{2}{3} \times 3\frac{1}{2}$
 $\frac{5}{3} \times \frac{7}{2} = \frac{35}{6} = 5\frac{5}{6}$

18. $1\frac{2}{5} \times 4\frac{1}{3}$
 $\frac{7}{5} \times \frac{13}{3} = \frac{91}{15} = 6\frac{1}{15}$

19. $\frac{1}{7} \times 1\frac{3}{5}$
 $\frac{1}{7} \times \frac{8}{5} = \frac{8}{35}$

20. $\frac{3}{5} \times 8\frac{1}{2}$
 $\frac{3}{5} \times \frac{17}{2} = \frac{51}{10} = 5\frac{1}{10}$

21. $3\frac{2}{5} \times 2\frac{1}{2}$
 $\frac{17}{5} \times \frac{5}{2} = \frac{17}{2} = 8\frac{1}{2}$

22. $1\frac{2}{3} \times 7\frac{1}{2}$
 $\frac{5}{3} \times \frac{15}{2} = \frac{75}{6} = 12\frac{1}{2}$

23. $1\frac{3}{10} \times 2\frac{6}{7}$
 $\frac{13}{10} \times \frac{20}{7} = \frac{26}{7} = 3\frac{5}{7}$

24. $\frac{3}{16} \times 1\frac{1}{7}$
 $\frac{3}{16} \times \frac{8}{7} = \frac{3}{14}$

25. $2\frac{6}{7} \times 1\frac{2}{5}$
 $4\frac{26}{7} \times \frac{7}{5} = \frac{26}{5} = 5\frac{1}{5}$

Solve.

26. Estimate the area of a window pane that has dimensions $6\frac{1}{8}$ by $11\frac{1}{4}$ inches.

$$6 \times 11 = 66 \text{ in}^2$$

27. A hamster is $2\frac{1}{2}$ inches long. A rabbit is $3\frac{1}{2}$ times as long as the hamster. How long is the rabbit?

$$2\frac{1}{2} \times 3\frac{1}{2} = 8\frac{3}{4} \text{ in}$$

Review 39

Dividing Fractions

Find $8 \div \frac{4}{5}$.

- ① The reciprocal of $\frac{4}{5}$ is $\frac{5}{4}$.

$$\frac{4}{5} \times \frac{5}{4}$$

- ② Multiply 8 by the reciprocal.

$$8 \div \frac{4}{5} = 8 \times \frac{5}{4} = \frac{2\cancel{8}}{1} \times \frac{5}{\cancel{4}_1} = \frac{2 \times 5}{1 \times 1} = 10$$

$$8 \div \frac{4}{5} = 10$$

Find $\frac{4}{9} \div \frac{8}{15}$.

- ① The reciprocal of $\frac{8}{15}$ is $\frac{15}{8}$.

$$\frac{8}{15} \times \frac{15}{8}$$

- ② Multiply $\frac{4}{9}$ by the reciprocal.

$$\frac{4}{9} \div \frac{8}{15} = \frac{4}{9} \times \frac{15}{8} = \frac{1\cancel{4}}{3\cancel{9}} \times \frac{15^{\cancel{5}}}{\cancel{8}_2} = \frac{1 \times 5}{3 \times 2} = \frac{5}{6}$$

$$\frac{4}{9} \div \frac{8}{15} = \frac{5}{6}$$

Write the reciprocal of each number.

1. $\frac{1}{4}$ $\frac{4}{1}$

2. $\frac{5}{3}$ $\frac{3}{5}$

3. $\frac{1}{20}$ $\frac{20}{1}$

4. $\frac{8}{9}$ $\frac{9}{8}$

5. 14 $\frac{1}{14}$

6. 18 $\frac{1}{18}$

7. $\frac{5}{9}$ $\frac{9}{5}$

8. $\frac{3}{11}$ $\frac{11}{3}$

9. $\frac{9}{7}$ $\frac{7}{9}$

10. $\frac{11}{12}$ $\frac{12}{11}$

11. $\frac{2}{7}$ $\frac{7}{2}$

12. $\frac{3}{15}$ $\frac{15}{3}$

Find each quotient.

13. $2 \div \frac{2}{3}$ 3

14. $7 \div \frac{7}{8}$ 8

15. $9 \div \frac{3}{4}$ 12

16. $6 \div \frac{2}{5}$ 15

17. $5 \div \frac{2}{3}$ $7\frac{1}{2}$

18. $14 \div \frac{5}{6}$ $16\frac{4}{5}$

19. $\frac{4}{5} \div \frac{4}{7}$ $1\frac{2}{5}$

20. $\frac{7}{8} \div \frac{7}{9}$ $1\frac{1}{8}$

21. $\frac{4}{7} \div 2$ $\frac{2}{7}$

22. $\frac{7}{8} \div \frac{2}{16}$ $1\frac{5}{16}$

23. $\frac{1}{2} \div 4$ $\frac{1}{8}$

24. $\frac{2}{5} \div \frac{3}{4}$ $\frac{8}{15}$

25. $\frac{9}{10} \div 3$ $\frac{3}{10}$

26. $\frac{3}{5} \div 5$ $\frac{3}{25}$

27. $\frac{5}{8} \div 10$ $\frac{1}{16}$

28. $\frac{3}{4} \div \frac{7}{8}$ $\frac{6}{7}$

29. $\frac{5}{6} \div \frac{1}{3}$ $2\frac{1}{2}$

30. $\frac{11}{12} \div \frac{3}{4}$ $1\frac{2}{9}$

Review 45

Ratios

A *ratio* is a comparison of two numbers by division. Each number in a ratio is called a *term*. You can write a ratio in three different ways. For example, the ratio 4 to 5 can be written:

4 to 5

4 : 5

$\frac{4}{5}$

Equal ratios name the same number. They have the same *simplest form*.

- To find equal ratios, multiply *or* divide both the numerator and denominator of a ratio by the same number.

Find a ratio equal to $\frac{4}{7}$.

$$\frac{4}{7} = \frac{4 \times 2}{7 \times 2} = \frac{8}{14}$$

$\frac{8}{14}$ is equal to $\frac{4}{7}$.

Find the simplest form for the ratio $\frac{16}{20}$.

$$\frac{16}{20} = \frac{16 \div 4}{20 \div 4} = \frac{4}{5}$$

$\frac{4}{5}$ is the simplest form for $\frac{16}{20}$.

Write three different ratios equal to each ratio.

1. $\frac{2}{5}$

$\frac{4}{10}$ 2 to 5 2:5

2. 1 : 3

$\frac{2}{6}$ 1 to 3 1:3

3. 3 to 4

$\frac{3}{4}$ $\frac{6}{8}$ 3:4

4. 5 : 8

$\frac{5}{8}$ $\frac{10}{16}$ 5 to 8

5. 2 to 7

$\frac{2}{7}$ $\frac{4}{14}$ 2:7

6. $\frac{1}{5}$

$\frac{2}{10}$ 1 to 5 1:5

7. 12 to 20

12:20 $\frac{12}{20}$ $\frac{3}{5}$

8. 6 : 16

6 to 16 $\frac{6}{16}$ $\frac{3}{8}$

Write each ratio in simplest form.

9. 32 : 16

$\frac{32}{16} = \frac{2}{1}$

10. $\frac{14}{24}$

$\frac{14}{24} = \frac{7}{12}$

11. $\frac{36}{50}$

$\frac{36}{50} = \frac{18}{25}$

12. 60 : 25

$\frac{60}{25} = \frac{12}{5}$

13. $\frac{25}{40}$

$\frac{25}{40} = \frac{5}{8}$

14. 60 : 180

$\frac{60}{180} = \frac{1}{3}$

15. $\frac{75}{120}$

$\frac{75}{120} = \frac{15}{24} = \frac{5}{8}$

16. 80 : 20

$\frac{80}{20} = \frac{4}{1}$

Find the value that makes the ratios equal.

17. 3 : 4, ? : 16

12

18. 20 to 25, 40 to ?

50

19. 9 to 12, 81 to ?

108

20. 7 : 10, ? : 100

70

21. 1 to 8, ? to 24

3

22. 30 : 120, 90 : ?

360

23. 5 : 100, 25 : ?

500

24. $\frac{7}{56}, \frac{?}{280}$

35

25. $\frac{6}{12}, \frac{36}{?}$

72

Review 46

A *rate* is a ratio that compares quantities that are measured in different units. Suppose a sprinter runs 100 yards in 10 seconds.

$$\frac{100 \text{ yd}}{10 \text{ s}} \text{ compares yards to seconds.}$$

A *unit rate* compares a quantity to one unit of another quantity.

You can find the unit rate by dividing by the denominator.

$$\frac{100 \text{ yd} \div 10}{10 \text{ s} \div 10} = \frac{10 \text{ yd}}{1 \text{ s}}$$

10 yards per second is the sprinter's unit rate.

Find the unit rate for each situation.

1. \$70 for 10 shirts

$$\frac{\$70}{10} = \underline{\$7/\text{shirt}}$$

2. \$150 for 3 games

$$\frac{\$150}{3} = \underline{\$50/\text{game}}$$

3. \$20 for 5 toys

$$\frac{\$20}{5} = \underline{\$4/\text{toy}}$$

4. \$120 for 6 shirts

$$\frac{\$120}{6} = \underline{\$20/\text{shirt}}$$

5. \$45 for 5 boxes

$$\frac{\$45}{5} = \underline{\$9/\text{box}}$$

6. \$132 for 3 books

$$\frac{\$132}{3} = \underline{\$44/\text{book}}$$

7. \$100 for 5 rackets

$$\frac{\$100}{5} = \underline{\$20/\text{racket}}$$

8. \$56 for 7 hours

$$\frac{\$56}{7} = \underline{\$8/\text{hr}}$$

9. \$1.98 for 6 cans

$$\frac{\$1.98}{6} = \underline{\$0.33/\text{can}}$$

Write the unit rate as a ratio. Then find an equal ratio.

10. The cost is \$4.25 for 1 item. Find the cost of 5 items.

$$\frac{4.25}{1} = \frac{21.25}{5} \quad \underline{\$21.25}$$

11. There are 7 cheerleaders in a squad. Find the number of cheerleaders on 12 squads.

$$\frac{7}{1} = \frac{84}{12} \quad \underline{84 \text{ cheerleaders}}$$

12. The cost is \$10.10 for 1 item. Find the cost of 10 items.

$$\frac{10.10}{1} = \frac{101}{10} \quad \underline{\$101.00}$$

13. There are 2.54 centimeters per one inch. Find the number of centimeters in 5 inches.

$$\frac{2.54}{1} = \frac{12.7}{5} \quad \underline{12.7 \text{ cm}}$$

14. The cost is \$8.50 for 1 item. Find the cost of 3 items.

$$\frac{8.50}{1} = \frac{25.5}{3} \quad \underline{\$25.50}$$

For Exercises 15–20, tell which unit rate is greater.

15. Dillan scores 24 points in 2 games. Eric scores 40 points in 4 games.

$$\frac{24}{2} = 12/\text{game} \quad \frac{40}{4} = 10/\text{game}$$

16. A fern grows 4 inches in 2 months. A tree grows 6 inches in 4 months.

$$\frac{4}{2} = 2 \text{ in}/\text{mo.} \quad \frac{6}{4} = 1\frac{1}{2} \text{ in}/\text{mo}$$

17. Tyler jogs 4 miles in 32 minutes. Joey jogs 2 miles in 18 minutes.

$$\frac{4}{32} = \frac{1}{8} \text{ mi}/\text{min} \quad \frac{2}{18} = \frac{1}{9} \text{ mi}/\text{min}$$

18. Dixie drinks 2 cups of water in 5 minutes. Dale drinks 10 cups of water in 12 minutes.

$$\frac{2}{5} \text{ cup}/\text{min} \quad \frac{10}{12} = \frac{5}{6} \text{ cup}/\text{min}$$

Review 50

Percents, Fractions, and Decimals

- To write a percent as a fraction in simplest form, first write a fraction with a denominator of 100. Then simplify.

$$74\% = \frac{74}{100} = \frac{37}{50}$$

- To write a percent as a decimal, first write a fraction with a denominator of 100. Then write the decimal.

$$74\% = \frac{74}{100} = 0.74$$

- To write a decimal as a percent, move the decimal point two places to the right.

$$0.23 = 23\%$$

Here are two ways to write a fraction as a percent.

- Write an equivalent fraction with a denominator of 100, then write the percent.

$$\frac{3}{20} = \frac{15}{100} = 15\%$$

- Divide the numerator by the denominator.

$$\begin{array}{r} \frac{3}{8} = \frac{0.375}{8 \overline{)3.000}} = 37.5\% \\ \underline{-24} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

↑
Move the decimal point two places to the right.

So, $\frac{3}{8} = 37.5\%$.

Write each percent as a decimal and as a fraction in simplest form.

- | | | | |
|--|---|---|--|
| 1. 30%
<u>0.3 $\frac{3}{10}$</u> | 2. 14%
<u>0.14 $\frac{14}{100} = \frac{7}{50}$</u> | 3. 16%
<u>0.16 $\frac{16}{100} = \frac{4}{25}$</u> | 4. 5%
<u>0.05 $\frac{5}{100} = \frac{1}{20}$</u> |
| 5. 92%
<u>0.92 $\frac{92}{100} = \frac{23}{25}$</u> | 6. 80%
<u>0.8 $\frac{8}{10} = \frac{4}{5}$</u> | 7. 21%
<u>0.21 $\frac{21}{100}$</u> | 8. 38%
<u>0.38 $\frac{38}{100} = \frac{19}{50}$</u> |

Write each fraction or decimal as a percent.

- | | | | |
|--|-----------------------------------|------------------------|------------------------------------|
| 9. $\frac{17}{25}$
<u>0.68 68%</u> | 10. 0.85
<u>85%</u> | 11. 0.16
<u>16%</u> | 12. $\frac{5}{40}$
<u>12.5%</u> |
| 13. $\frac{7}{200}$
<u>3.5%</u> | 14. $\frac{1}{10}$
<u>10%</u> | 15. 0.64
<u>64%</u> | 16. 0.008
<u>0.8%</u> |
| 17. $\frac{9}{20}$
<u>45%</u> | 18. $\frac{6}{15}$
<u>40%</u> | 19. 0.32
<u>32%</u> | 20. 0.07
<u>7%</u> |
| 21. $\frac{13}{100}$
<u>13%</u> | 22. $\frac{45}{50}$
<u>90%</u> | 23. 0.010
<u>1%</u> | 24. 0.60
<u>60%</u> |

Review 54

Mean, Median, and Mode

- The *mean* of a set of data is the sum of the values divided by the number of data items.

$$74 + 77 + 80 + 81 + 85 + 87 + 94 + 94 = 672$$

$$672 \div 8 = 84$$

The mean math test grade is 84.

- The *median* of a data set is the middle value when the data are arranged in numerical order. When the grades are arranged in order from least to greatest, there are two middle numbers.

$$74, 77, 80, 81, 85, 87, 94, 94$$

To find the median, add the two middle numbers and divide the total by 2.

$$81 + 85 = 166$$

$$166 \div 2 = 83$$

The median grade is 83.

- The *mode* of a data set is the item in the data set that appears most often. For this data, 94 is the mode.

Math Test Grades	
Sharon	81
Rashid	94
Durrin	77
Nicole	80
Terry	74
Mei-lin	94
Kevin	87
Carlos	85

Find the mean of each data set.

1. 8, 6, 5, 9, 7, 13

$$\underline{48 \div 6 \quad 8}$$

2. 12, 10, 16, 14, 8, 24

$$\underline{84 \div 6 \quad 14}$$

3. 9, 12, 14, 6, 8, 5

$$\underline{54 \div 6 \quad 9}$$

4. 104, 126, 128, 100, 97

$$\underline{555 \div 5 \quad 111}$$

5. 86, 68, 70, 48, 66, 76

$$\underline{414 \div 6 \quad 69}$$

6. 65, 50, 95, 35, 75, 100

$$\underline{420 \div 6 \quad 70}$$

Find the median of each data set.

7. ~~5~~, ~~4~~, 7, 9, 8 4, 5, 7, 8, 9

$$\underline{7}$$

8. ~~12~~, 14, 14, 16, 18, 19

$$\underline{15}$$

9. 9, 19, 21, 13

$$\underline{16}$$

10. 46, 38, 22, 48, 61

$$\underline{46}$$

11. ~~60~~, ~~57~~, ~~53~~, 78, 44, 81

$$\underline{55}$$

12. 8, ~~6~~, ~~6~~, ~~8~~, 8, 9

$$\underline{7}$$

Find the mode of each data set.

13. ~~3~~, ~~4~~, 5, 5, ~~3~~, 5, ~~4~~, 2

$$\underline{5}$$

14. 1, ~~2~~, 1, 1, 2, 2, 3, 1

$$\underline{1}$$

15. 6, 8, 3, 8, 3, 9, 3

$$\underline{3}$$

16. 33, 35, 34, 33, 35, 33

$$\underline{33}$$

17. 98, 97, 98, 98, 97

$$\underline{98}$$

18. 110, 121, 121, 110, 115, 117, 119

$$\underline{110, 121}$$

Review 73

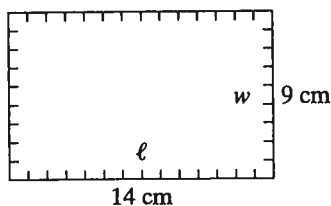
Perimeters and Areas of Rectangles

Perimeter

The *perimeter* of a figure is the sum of the lengths of its sides. Opposite sides of a rectangle are equal. To find the perimeter, add the 2 lengths (ℓ) and the 2 widths (w).

$$P = \ell + \ell + w + w \text{ or } P = 2\ell + 2w$$

Find the perimeter.



$$\begin{aligned} P &= 2\ell + 2w \\ &= 2(14) + 2(9) \\ &= 28 + 18 = 46 \end{aligned}$$

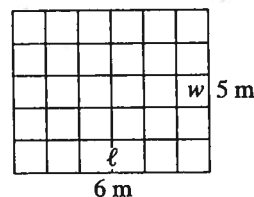
The perimeter is 46 centimeters.

Area

The *area* of a figure is the number of square units needed to cover the figure. To find the area of a rectangle, multiply the length (ℓ) and the width (w).

$$A = \ell \times w$$

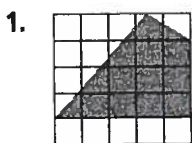
Find the area.



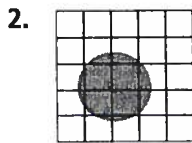
$$\begin{aligned} A &= \ell \times w \\ &= 6 \times 5 \\ &= 30 \end{aligned}$$

The area is 30 square meters.

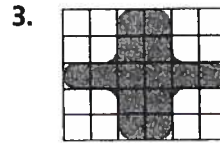
Estimate the area of each figure. Each square represents 1 square inch.



$\approx 12 \text{ in}^2$



$\approx 5 \text{ in}^2$



$\approx 14 \text{ in}^2$

Find the perimeter and area of each rectangle or square.

4. $\ell = 12 \text{ cm}, w = 2 \text{ cm}$

$P = 28 \text{ cm} \quad A = 24 \text{ cm}^2$

5. $\ell = 9 \text{ ft}, w = 7.5 \text{ ft}$

$P = 33 \text{ ft} \quad A = 67.5 \text{ ft}^2$

6. $\ell = 2.5 \text{ m}, w = 2.5 \text{ m}$

$P = 10 \text{ m} \quad A = 6.25 \text{ m}^2$

7. $\ell = 5.5 \text{ in.}, w = 5.5 \text{ in.}$

$P = 22 \text{ in} \quad A = 30.25 \text{ in}^2$

8. $\ell = 6.2 \text{ in.}, w = 3.4 \text{ in.}$

$P = 19.2 \text{ in} \quad A = 21.08 \text{ in}^2$

9. $\ell = 4.5 \text{ ft}, w = 0.75 \text{ ft}$

$P = 10.5 \text{ ft} \quad A = 3.375 \text{ ft}^2$

10. $\ell = 8 \text{ cm}, w = 8 \text{ cm}$

$P = 32 \text{ cm} \quad A = 64 \text{ cm}^2$

11. $\ell = 10.5 \text{ m}, w = 5.2 \text{ m}$

$P = 31.4 \text{ m} \quad A = 54.6 \text{ m}^2$

12. $\ell = 22 \text{ in.}, w = 9 \text{ in.}$

$P = 62 \text{ in} \quad A = 198 \text{ in}^2$

13. What is the area of a square with a perimeter of 60 meters?

225 m^2

$60 \div 4 = 15 \text{ m}$
 15×15

Review 74

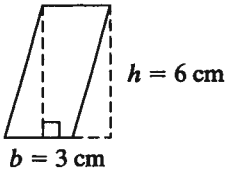
Areas of Parallelograms and Triangles

Parallelogram

To find the area of a parallelogram, multiply base times height.

$$A = b \times h$$

Find the area of the parallelogram.



$$\begin{aligned} A &= b \times h \\ &= 3 \times 6 \\ &= 18 \end{aligned}$$

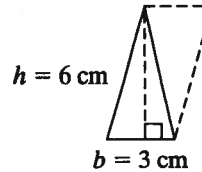
The area is 18 square centimeters.

Triangle

The area of a triangle is $\frac{1}{2}$ times the base times the height.

$$A = \frac{1}{2}b \times h$$

Find the area of the triangle.



$$\begin{aligned} A &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 3 \times 6 \\ &= 9 \end{aligned}$$

The area is 9 square centimeters.

Find the area of each parallelogram.

1. $b = 6 \text{ ft}, h = 8 \text{ ft}$

48 ft²

2. $b = 12 \text{ in}, h = 9 \text{ in.}$

108 in²

3. $b = 6 \text{ yd}, h = 12 \text{ yd}$

72 yd²

4. $b = 2.8 \text{ in.}, h = 3.4 \text{ in.}$

9.52 in²

5. $b = 31 \text{ yd}, h = 19 \text{ yd}$

589 yd²

6. $b = 4.5 \text{ m}, h = 4.5 \text{ m}$

20.25 m²

7. $b = 15 \text{ cm}, h = 7 \text{ cm}$

105 cm²

8. $b = 8.3 \text{ ft}, h = 11.7 \text{ ft}$

97.11 ft²

9. $b = 14.4 \text{ m}, h = 6.5 \text{ m}$

93.6 m²

Find the area of each triangle.

10. $b = 8 \text{ cm}, h = 14 \text{ cm}$

56 cm²

11. $b = 7 \text{ in.}, h = 18 \text{ in.}$

63 in²

12. $b = 11 \text{ m}, h = 4.6 \text{ m}$

25.3 m²

13. $b = 6.4 \text{ ft}, h = 3.5 \text{ ft}$

11.2 ft²

14. $b = 104 \text{ in.}, h = 55 \text{ in.}$

2860 in²

15. $b = 5.9 \text{ cm}, h = 4.2 \text{ cm}$

12.39 cm²

16. $b = 1.7 \text{ m}, h = 3.3 \text{ m}$

2.805 m²

17. $b = 5.8 \text{ yd}, h = 5.8 \text{ yd}$

16.82 yd²

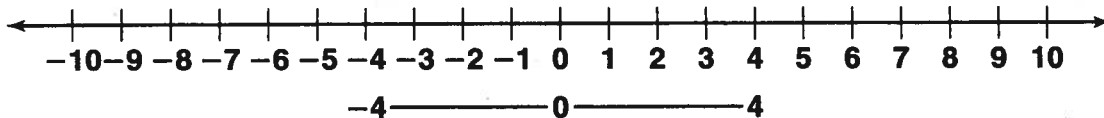
18. $b = 8.6 \text{ in.}, h = 0.8 \text{ in.}$

3.44 in²

Review 81

Using a Number Line

The numbers . . . -3, -2, -1, 0, +1, +2, +3, . . . are *integers*.
 Integers are the set of positive whole numbers, their opposites, and 0.

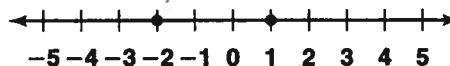


The absolute value of a number is its distance from 0 on a number line. $|-4| = 4$. *Opposite integers*, like -4 and 4, are the same distance from 0.

Compare -2 and 1.

For two integers on a number line, the greater integer is farther to the right.

- ① Locate -2 and 1 on the number line.
- ② Find that 1 is farther to the right.
- ③ Write $1 > -2$ (1 is greater than -2),
or $-2 < 1$ (-2 is less than 1.)



Name the opposite of each integer.

- | | | |
|-----------------------|--------------------|------------------|
| 1. 7 <u>-7</u> | 2. -212 <u>212</u> | 3. 49 <u>-49</u> |
| 4. 1,991 <u>-1991</u> | 5. -78 <u>78</u> | 6. 16 <u>-16</u> |

Compare using $<$ or $>$.

- | | | | |
|--------------|---------------|--------------|---------------|
| 7. 6 $>$ 3 | 8. 2 $<$ 8 | 9. -2 $<$ 2 | 10. 9 $>$ -9 |
| 11. 0 $<$ 5 | 12. -9 $<$ -5 | 13. 0 $<$ 10 | 14. -5 $<$ -2 |
| 15. 7 $>$ -9 | 16. -5 $<$ -1 | 17. 6 $>$ -6 | 18. -12 $<$ 0 |
| 19. 8 $>$ -3 | 20. -1 $>$ -2 | 21. -5 $<$ 4 | 22. -3 $<$ -2 |

Find each absolute value.

- | | | |
|-------------------------|----------------------------|----------------------------|
| 23. $ -2 $
<u>2</u> | 24. $ -100 $
<u>100</u> | 25. $ -16 $
<u>16</u> |
| 26. $ 8 $
<u>8</u> | 27. $ -25 $
<u>25</u> | 28. $ -250 $
<u>250</u> |
| 29. $ 16 $
<u>16</u> | 30. $ 12 $
<u>12</u> | 31. $ 75 $
<u>75</u> |

Review 86

Graphing in the Coordinate Plane

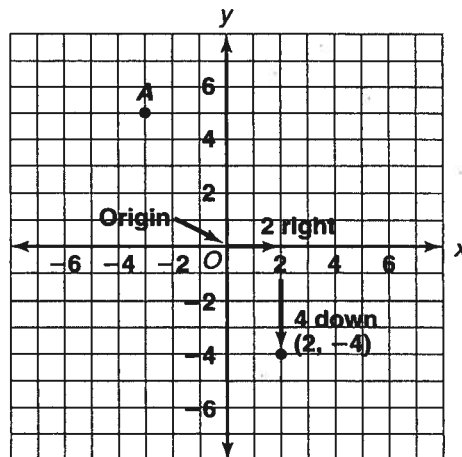
Example: Graph $(2, -4)$.

- 2 is the *x-coordinate*. It tells how far to move left or right from the origin.
- -4 is the *y-coordinate*. It tells how far to move up or down from the origin.

Find the coordinates of point *A*.

- ① Start at the origin.
- ② How far left or right? *3 left*
The *x-coordinate* is -3 .
- ③ How far up or down? *5 up*
The *y-coordinate* is 5 .

The coordinates of point *A* are $(-3, 5)$.



Graph each point in a coordinate plane.

- | | |
|----------------|----------------|
| 1. $B(1, 6)$ | 2. $C(-4, -3)$ |
| 3. $D(0, 5)$ | 4. $E(-2, 2)$ |
| 5. $F(-1, -5)$ | 6. $G(6, -4)$ |
| 7. $H(5, 5)$ | 8. $J(4, 0)$ |
| 9. $K(-4, -4)$ | 10. $L(2, -3)$ |
| 11. $M(-2, 0)$ | 12. $N(5, -1)$ |
| 13. $P(0, -3)$ | 14. $Q(-4, 0)$ |

Find the coordinates of each point.

- | | |
|-------------------------------------|-------------------------------------|
| 15. R <u>$(4, -1)$</u> | 16. S <u>$(-3, 5)$</u> |
| 17. T <u>$(0, 1)$</u> | 18. U <u>$(-3, 2)$</u> |

Look at the coordinate grid above.

19. If you travel 7 units down from *S*, at which point will you be located?

U

20. If you travel 4 units right from *T* and 2 units down, at which point will you be located?

R

