Oregon OSAS Grade 8 Math Summer Workbook

8-Week Skills Practice with Quick Reviews and Answers

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SUMMER PRACTICE

Grade 8 Math Summer Workbook

Quick Reviews, Workbook Practice, Mixed Reviews, and Answers

This workbook keeps Grade 8 math fresh with short review lessons and strong daily practice. Each week moves from focused skills to a Friday mixed review, so students can remember the method, choose the right strategy, and explain their thinking.

- Read the Quick Review.
- Complete the workbook practice.
- Use Friday for mixed review.
- Study the answer explanations after trying first.

How to Use This Workbook

Use one short lesson at a time, then check and learn from mistakes.

The Weekly Routine

Monday-Thursday	Read the Quick Review, then complete one workbook practice set.
Friday	Complete the weekly mixed review to connect the week's skills.
After practice	Check answers and read each explanation for any problem that felt uncertain.

For students

Try the problems before looking at the answer key. If you miss a problem, read the explanation, correct your work, and mark the skill to revisit later.

For parents and teachers

The workbook pages are designed for steady practice. Use the Quick Review for a short reteach, and use the answer explanations as the teaching step after a mistake.

Best practice habit

Show your reasoning. Grade 8 math is easier to check when you label variables, mark points on a graph, write equations, and include units or vocabulary in your answer.

Goal

By the end of 8 weeks, students will have reviewed major Grade 8 skills with workbook-style practice, visual models, mixed reviews, and teaching answer explanations.

What's Inside?

An 8-week workbook plan for Grade 8 summer math practice.

Week 1	Rational and irrational numbers, roots, integer exponents, scientific notation.
Week 2	Square and cube roots, scientific notation operations, proportional graphs.
Week 3	Slope, equations of lines, one-variable equations, systems of equations.
Week 4	Real-world systems, functions, comparing functions, linear and nonlinear patterns.
Week 5	Linear functions, graph descriptions, rigid transformations, congruence.
Week 6	Coordinate transformations, similarity, dilations, angles, Pythagorean theorem.
Week 7	Distance, volume formulas, scatter plots, trend lines, data interpretation.
Week 8	Linear models, two-way tables, variability, probability, and cumulative review.

Quick Reviews

Each topic begins with a compact review of the ideas, formulas, and methods students need before starting the practice.

Weekly Reviews

Friday pages mix the week's skills so students practice choosing the right method instead of following only one pattern.

Workbook Practice

Practice sets include computation, word problems, graphs, tables, diagrams, models, and short reasoning.

Answers

The answer key includes explanations that show the method and reasoning, not just the final answer.

The goal is steady confidence, not rushed memorization.

Grade 8 Reference Sheet

High-yield formulas and reminders for quick review

Exponents

$a^m \cdot a^n = a^{m+n}$

$\frac{a^m}{a^n} = a^{m-n}$

$(a^m)^n = a^{mn}$

$(ab)^n = a^n b^n$

$a^0 = 1$ for $a \neq 0$

$a^{-n} = \frac{1}{a^n}$

Scientific Notation

$a \times 10^n$, where $1 \leq |a| < 10$

Multiply: multiply decimals, add exponents.

Divide: divide decimals, subtract exponents.

Positive exponent: number is large.

Negative exponent: number is small.

Roots and Real Numbers

Perfect squares: $1, 4, 9, 16, 25, 36$

$49, 64, 81, 100, 121, 144$

Perfect cubes: $1, 8, 27, 64, 125$

$\sqrt{2} \approx 1.414$, $\sqrt{3} \approx 1.732$, $\pi \approx 3.14159$

Irrational numbers are nonrepeating, nonterminating decimals.

Slope and Lines

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$

Slope-intercept form: $y = mx + b$

m is slope, b is the y-intercept.

Proportional relationship: $y = mx$ and graph passes through $(0, 0)$.

Systems of Equations

A solution is the point where two graphs meet.

One solution: different slopes.

No solution: same slope, different intercepts.

Infinitely many solutions: same line.

Use substitution or elimination to solve exactly.

Functions

Each input has exactly one output.

Use the vertical line test on graphs.

Linear functions have a constant rate of change.

In $y = mx + b$, the initial value is b.

Compare functions by rate of change and initial value.

Transformations

Translation: slide. Reflection: flip. Rotation: turn.

These rigid motions keep lengths and angle measures.

Dilation: resize by scale factor k.

$k > 1$ enlarges; $0 < k < 1$ reduces.

Congruent figures are same size and shape. Similar figures have proportional sides.

Angle Relationships

Triangle angle sum: 180°

Exterior angle = sum of the two remote interior angles.

Vertical angles are congruent.

With parallel lines, alternate interior angles are congruent.

Same-side interior angles sum to 180°.

Pythagorean Theorem

For a right triangle, $a^2 + b^2 = c^2$.

c is the hypotenuse, the longest side.

Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Use the theorem to check whether a triangle is right.

Volume

Cylinder: $V = \pi r^2 h$

Cone: $V = \frac{1}{3}\pi r^2 h$

Sphere: $V = \frac{4}{3}\pi r^3$

Use the same cubic unit as the dimensions.

If dimensions scale by k, volume scales by k^3.

Scatter Plots

Positive association: points trend upward.

Negative association: points trend downward.

No association: no clear pattern.

A line of fit models the trend.

Slope describes the average rate of change.

Two-Way Tables

Rows and columns group categorical data.

Relative frequency = part divided by total.

Use row, column, or table totals depending on the question.

Compare percentages, not just counts.

Variability and Probability

Mean absolute deviation measures typical distance from the mean.

$\text{MAD} = \frac{\text{sum of absolute deviations}}{\text{number of values}}$

Probability: $0 \leq P(\text{event}) \leq 1$

Experimental probability uses results. Theoretical probability uses equally likely outcomes.

Table of Contents

8-week review plan

WEEK

1

The Number System

This Week's Days

Day 1 Rational and Irrational Numbers

SKILL SNAPSHOT

A **rational number** can be written as $\frac{a}{b}$, where a and b are integers and $b \neq 0$. An **irrational number** cannot be written as a ratio of integers.

Number type	Decimal pattern	Example
Rational	terminates or repeats	$0.75,\ -4,\ 0.\overline{3},\ \sqrt{49}$
Irrational	never terminates and never repeats	$\sqrt{2},\ \pi,\ \sqrt{18}$

- ☑ Integers, fractions, terminating decimals, and repeating decimals are rational.
- ☑ $\sqrt{n}$ is rational when n is a perfect square.
- ☑ Square roots of non-perfect squares are irrational.
- ☑ To convert a repeating decimal, multiply by a power of 10, subtract, and solve.
- ☑ Use the decimal pattern or fraction form as evidence.

Remember: Do not classify a number by how complicated it looks. Check whether it can be written as a fraction of integers.

Classify each number.

1. Classify $\sqrt{64}$ as rational or irrational. _____
2. Classify $\sqrt{45}$ as rational or irrational. _____
3. Classify $-\frac{17}{5}$. _____
4. Classify 0.3125. _____
5. Classify $0.412412412\ldots$. _____
6. Classify π. _____

Use a table or pattern as evidence.

7. Use the table. Which listed numbers are rational? _____

$\sqrt{81}$	$0.\overline{27}$	$\sqrt{12}$	-9

8. Use the perfect-square chart to classify $\sqrt{72}$. _____

6^2	7^2	8^2	9^2	10^2
36	49	64	81	100

9 A number line mark is placed at $2.2360679\ldots$, with no repeating pattern. Is this evidence for rational or irrational? _____

10 Which number is irrational?

A. $\sqrt{100}$ **B.** 0.125

C. $\sqrt{30}$ **D.** $0.\overline{8}$

Convert repeating decimals to fractions.

11 Convert $0.\overline{4}$ to a fraction. _____

12 Convert $0.\overline{18}$ to a fraction. _____

13 Convert $0.3\overline{5}$ to a fraction. _____

14 Convert $0.\overline{9}$ to a fraction. _____

Reason about classifications.

15 True or False: Every square root is irrational. ☐ True ☐ False

16 A student says $0.101001000100001\ldots$ is rational because it has a visible pattern. Is the student correct? Explain briefly. _____

Day 2 Estimating Irrational Numbers

SKILL SNAPSHOT

Estimate square roots by trapping the number between nearby perfect squares, then deciding where it belongs on a number line.

- If $a^2 < n < b^2$, then $\sqrt{n}$ is between a and b.
- Use perfect-square landmarks such as $36, 49, 64, 81,$ and 100.
- For nearest tenth estimates, square tenths such as 7.2^2 or 7.3^2.
- Compare $\sqrt{n}$ to a decimal by squaring the decimal.
- A square-root estimate should be near the root, not near the radicand.

Remember: For example, $36 < 42 < 49$, so $6 < \sqrt{42} < 7$. Since 42 is closer to 36 than to 49, the root is closer to 6.

Find the whole-number bounds.

1. $\sqrt{27}$ is between which two consecutive whole numbers? _____
2. $\sqrt{90}$ is between which two consecutive whole numbers? _____
3. $\sqrt{8}$ is between which two consecutive whole numbers? _____
4. Use the chart to bound $\sqrt{55}$.

_____

7^2	8^2	9^2	10^2
49	64	81	100

Estimate to the nearest whole number or tenth.

5. Estimate $\sqrt{35}$ to the nearest whole number.

_____

6. Estimate $\sqrt{70}$ to the nearest whole number.

_____

7. Estimate $\sqrt{14}$ to the nearest tenth.

_____

8. Estimate $\sqrt{65}$ to the nearest tenth.

_____

9. Estimate $\sqrt{115}$ to the nearest tenth.

_____

10. Estimate $\sqrt{6}$ to the nearest tenth.

_____

Use number lines and comparisons.

11 Use the number line. Which is the best estimate for $\sqrt{52}$? _____

12 Use the number line. Is $\sqrt{30}$ greater than or less than 5.5? _____

13 Fill in $<$, $>$, or $=$. $\sqrt{41}$ ____ 6.4

14 Order from least to greatest: 4.6, $\sqrt{20}$, 4.4. _____

Apply the estimate.

15 A square patio has area 95 ft^2. Estimate its side length to the nearest tenth. _____

16 Which is the best estimate for $\sqrt{3}$?

A. 1.2 **B.** 1.7

C. 2.3 **D.** 3.0

Day 5

Week 1 Mixed Review

WEEKLY SKILL CHECK

This review mixes rational and irrational numbers, square-root estimation, expressions with irrational numbers, and exponent rules.

- ☑ Classify numbers by fraction form, decimal pattern, or perfect-square roots.
- ☑ Estimate square roots using nearby perfect squares and number lines.
- ☑ Estimate expressions one part at a time, then follow order of operations.
- ☑ Use exponent rules for multiplication, division, powers, zero exponents, and negative exponents.

Remember: On mixed review, first identify the skill type: classification, estimation, expression evaluation, or exponent simplification.

Rational and irrational numbers.

1. Classify each number as rational or irrational: $\sqrt{25},\ \sqrt{28},\ 0.\overline{12},\ \pi$.

2. Which number is rational?

   A. $\sqrt{7}$ **B.** $\sqrt{49}$

   C. π **D.** $\sqrt{50}$

3. Convert $0.\overline{3}$ to a fraction. _____

4. True or False: Every terminating decimal is rational. ☐ True ☐ False

Estimate square roots.

5. $\sqrt{60}$ is between which two whole numbers? _____

6. Estimate $\sqrt{22}$ to the nearest tenth. _____

7. Use the number line to estimate $\sqrt{78}$ to the nearest whole number. _____

8 Fill in $<$, $>$, or $=$. $\sqrt{18}$ ——— 4.3

Estimate expressions.

9 Estimate $\sqrt{40} + 1.5$ to the nearest tenth.

_____

10 Estimate $2\sqrt{13}$ to the nearest tenth.

_____

11 A square has area 32 in^2. Estimate its perimeter to the nearest tenth. _____

32 in^2

12 Which is closest to $\pi + \sqrt{5}$?

A. 4.1 **B.** 5.4

C. 6.8 **D.** 8.2

Exponent rules.

13 Simplify $2^5 \cdot 2^3$. _____

14 Simplify $\frac{x^8}{x^2}$. _____

15 Simplify $(4^2)^3$. _____

16 Write 3^{-3} with a positive exponent.

_____

WEEK

2

Proportional Graphs

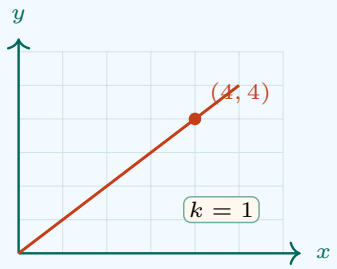
This Week's Days

Day 4 Graphing Proportional Relationships

SKILL SNAPSHOT

A proportional relationship has equation $y = kx$. Its graph is a straight line through the origin, and k is the constant of proportionality.

- ☑ In a table, divide y by x for each nonzero x.
- ☑ In an equation, proportional relationships have the form $y = kx$ with no added constant.
- ☑ On a graph, the line must pass through $(0, 0)$.
- ☑ The constant k is also the slope or unit rate.
- ☑ Use $y = kx$ to find missing values once k is known.



Remember: A straight line can be linear without being proportional. Proportional graphs must include the origin.

Find the constant of proportionality.

1 In a proportional relationship, $x = 4$ and $y = 18$. Find k. _____

2 A graph of a proportional relationship passes through $(6, 15)$. Find the unit rate.

_____

3 Use the table to find k. _____

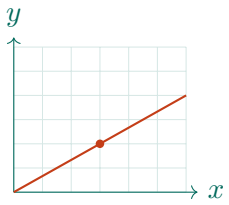
x	2	5	8
y	7	17.5	28

4 Use the table. Is the relationship proportional? _____

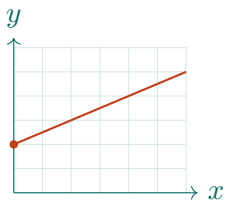
x	1	3	6
y	4	12	24

Interpret graphs.

5 Does the graph show a proportional relationship? _____



6 Does the graph show a proportional relationship? _____



7 Use the graph through $(0, 0)$ and $(5, 20)$. What is the equation? _____

Equations and missing values.

8 Which equation is proportional?

A. $y = 7x$ **B.** $y = 7x + 2$

C. $y = x - 7$ **D.** $y = 7$

9 Is $y = 0.8x$ proportional? _____

10 Is $y = 3x - 5$ proportional? _____

11 If $y = 2.25x$, find y when $x = 12$.

_____

Applications and comparisons.

12 A printer produces 45 pages in 3 minutes at a constant rate. Write the proportional equation.

_____

13 A cyclist travels according to $y = 14x$, where x is hours and y is miles. Another cyclist travels 45 miles in 3 hours. Who is faster? _____

14 True or False: A proportional relationship can include the point $(0, 5)$. ☐ True ☐ False

15 Use the table. Which store has the lower unit price? _____

Store	Pounds	Cost
A	4	$18
B	6	$24

16 A line through the origin contains $(9, 6)$. Find y when $x = 15$. _____

WEEK

6

Geometry and the Pythagorean Theorem

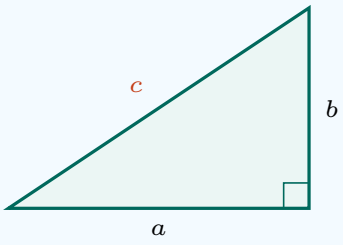
This Week's Days

Day 4 The Pythagorean Theorem

SKILL SNAPSHOT

In a right triangle, the legs a and b and hypotenuse c satisfy $a^2 + b^2 = c^2$. The hypotenuse is opposite the right angle and is always the longest side.

- To find a hypotenuse, add the squares of the legs.
- To find a missing leg, subtract the known leg square from the hypotenuse square.
- The converse checks whether three side lengths form a right triangle.
- Round only at the end when a square root is not exact.



$$a^2 + b^2 = c^2$$

Find missing sides.

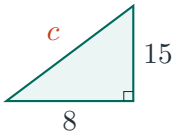
1. A right triangle has legs 9 and 12. Find the hypotenuse. _____

2. A right triangle has legs 7 and 24. Find the hypotenuse. _____

3. A right triangle has hypotenuse 13 and one leg 5. Find the other leg. _____

4. A right triangle has hypotenuse 20 and one leg 16. Find the other leg. _____

5. Find the missing side.



_____

6. Find the missing leg when $c = 26$ and the other leg is 10. _____

Use the converse.

7. Do side lengths $10, 24, 26$ form a right triangle? _____

8. Do side lengths $8, 14, 17$ form a right triangle? _____

9. Which set forms a right triangle?

A. $5, 6, 7$ **B.** $6, 8, 10$

C. $7, 8, 9$ **D.** $9, 10, 12$

10 True or False: In a right triangle, the hypotenuse can be shorter than a leg.

☐ True ☐ False

11 A triangle has side lengths $9, 9, 13$. Is it a right triangle? _____

Apply the theorem.

12 A ladder is 15 ft long. Its foot is 9 ft from a wall. How high does it reach? _____

13 A rectangular field is 30 m by 40 m. Find the diagonal distance across the field. _____

14 A ramp rises 3 ft over a horizontal run of 11 ft. Find the ramp length to the nearest tenth.

_____

Coordinate and 3D uses.

15 Find the distance between $(1, 2)$ and $(7, 10)$.

_____

16 A box is 6 cm by 8 cm by 24 cm. Find the space diagonal. _____

ANSWER KEY

Answer Key & Explanations

Use the answers to check your work, then read the explanations to learn the method.

How to review

First compare your final answer. If it does not match, read the explanation slowly and redo the problem beside it. The goal is to understand the move that gets you from the question to the final answer.

Week 1 Day 1: Rational and Irrational Numbers

Answers

1 Rational | 2 Irrational | 3 Rational | 4 Rational | 5 Rational | 6 Irrational

7 $\sqrt{81},\ 0.\overline{27},\ -9$ | 8 Irrational | 9 Irrational | 10 C | 11 $\frac{4}{9}$ | 12 $\frac{2}{11}$ | 13 $\frac{16}{45}$

14 1 | 15 False | 16 No

Explanations

1. Since 64 is a perfect square, $\sqrt{64} = 8$. The number 8 can be written as $\frac{8}{1}$, so it is rational.

2. The number 45 is not a perfect square. Therefore $\sqrt{45}$ has a nonterminating, nonrepeating decimal, so it is irrational.

3. A fraction of two integers with a nonzero denominator is rational. The negative sign does not change the fact that $-\frac{17}{5}$ is a ratio of integers.

4. The decimal terminates, so it can be written as a fraction. In fact, $0.3125 = \frac{3125}{10000}$, which can be simplified.

5. The block 412 repeats forever. Every repeating decimal can be written as a fraction, so this number is rational.

6. The decimal form of π does not terminate or repeat. A number with that decimal pattern cannot be written as a ratio of integers.

7. $\sqrt{81} = 9$, the repeating decimal can be converted to a fraction, and $-9 = \frac{-9}{1}$. The only irrational number listed is $\sqrt{12}$, because 12 is not a perfect square.

8. The chart shows that 72 is between 64 and 81, but it is not a perfect square. A square root of a non-perfect square is irrational.

9. A decimal that continues without a repeating block is irrational. The important evidence is the nonterminating, nonrepeating pattern, not the number of digits shown.

10 $\sqrt{30}$ is irrational because 30 is not a perfect square. The other choices are an integer, a terminating decimal, and a repeating decimal, so they are rational.

11 Let $x = 0.\overline{4}$. Then $10x = 4.\overline{4}$, and subtracting gives $9x = 4$, so $x = \frac{4}{9}$.

12 Let $x = 0.\overline{18}$. Then $100x = 18.\overline{18}$, so $99x = 18$, and $\frac{18}{99}$ simplifies to $\frac{2}{11}$.

13 Let $x = 0.3555\ldots$. Then $100x = 35.555\ldots$ and $10x = 3.555\ldots$, so $90x = 32$, giving $x = \frac{32}{90} = \frac{16}{45}$.

14 Let $x = 0.\overline{9}$. Then $10x = 9.\overline{9}$, so subtracting gives $9x = 9$, and $x = 1$.

15 Square roots of perfect squares are rational. For example, $\sqrt{121} = 11$, and 11 can be written as $\frac{11}{1}$.

16 A rational decimal must terminate or repeat the same block forever. This decimal has a pattern, but the block does not repeat in a fixed cycle, so it is not evidence of a rational number.

Week 1 Day 2: Estimating Irrational Numbers

Answers

1 5 and 6 | 2 9 and 10 | 3 2 and 3 | 4 7 and 8 | 5 6 | 6 8 | 7 3.7 | 8 8.1
9 10.7 | 10 2.4 | 11 7.2 | 12 Less than 5.5 | 13 $>$ | 14 4.4, $\sqrt{20}$, 4.6 | 15 9.7 ft
16 B

Explanations

1 Use nearby perfect squares: $25 < 27 < 36$. Taking square roots gives $5 < \sqrt{27} < 6$.

2 $81 < 90 < 100$, so $\sqrt{90}$ is between $\sqrt{81} = 9$ and $\sqrt{100} = 10$.

3 $4 < 8 < 9$, so $\sqrt{8}$ is between 2 and 3. The root is closer to 3 because 8 is close to 9.

4 The chart shows $49 < 55 < 64$. Therefore $\sqrt{55}$ is between 7 and 8.

5 35 is between 25 and 36, and it is much closer to 36. Therefore $\sqrt{35}$ rounds to 6.

6 70 is between $64 = 8^2$ and $81 = 9^2$. It is closer to 64, so $\sqrt{70}$ rounds to 8.

7 $3.7^2 = 13.69$ and $3.8^2 = 14.44$. Since 14 is closer to 13.69, $\sqrt{14} \approx 3.7$.

8 $8.0^2 = 64$ and $8.1^2 = 65.61$. The value 65 is closer to 65.61 than to 64, so the nearest tenth estimate is 8.1.

9 $10.7^2 = 114.49$ and $10.8^2 = 116.64$. Since 115 is closer to 114.49, the nearest tenth estimate is 10.7.

10 $2.4^2 = 5.76$ and $2.5^2 = 6.25$. The value 6 is closer to 5.76, so $\sqrt{6} \approx 2.4$.

11 $7.2^2 = 51.84$, which is very close to 52. The number line places $\sqrt{52}$ just to the right of 7.2.

12 $5.5^2 = 30.25$, which is greater than 30. Therefore $\sqrt{30}$ must be slightly less than 5.5.

13 $6.4^2 = 40.96$, which is slightly less than 41. Since 6.4 squared is too small, $\sqrt{41}$ is slightly greater than 6.4.

14 $\sqrt{20} \approx 4.5$, because $4.5^2 = 20.25$. That places it between 4.4 and 4.6.

15 The side length is $\sqrt{95}$. Since $9.7^2 = 94.09$ and $9.8^2 = 96.04$, $\sqrt{95}$ is about 9.7 ft.

16 $\sqrt{3}$ is between 1 and 2. Since $1.7^2 = 2.89$ and $1.8^2 = 3.24$, the best choice is 1.7.

Week 1 Day 5: Week 1 Mixed Review

Answers

1. $\sqrt{25}$ and $0.\overline{12}$ are rational; $\sqrt{28}$ and π are irrational.
2. B
3. $\frac{1}{3}$
4. True
5. 7 and 8
6. 4.7
7. 9
8. $<$
9. 7.8
10. 7.2
11. 22.6 in.
12. B
13. $2^8 = 256$
14. x^6
15. 4^6
16. $\frac{1}{27}$

Explanations

1. $\sqrt{25} = 5$, and a repeating decimal can be written as a fraction. The number 28 is not a perfect square, and π does not terminate or repeat.

2. $\sqrt{49} = 7$, so it can be written as $\frac{7}{1}$. The other square roots are from non-perfect squares, and π is irrational.

3. Let $x = 0.\overline{3}$. Then $10x = 3.\overline{3}$, so $9x = 3$, and $x = \frac{3}{9} = \frac{1}{3}$.

4. A terminating decimal can be written over a power of 10. For example, $0.47 = \frac{47}{100}$, so terminating decimals are rational.

5. $49 < 60 < 64$, so $\sqrt{60}$ is between 7 and 8. It is close to 8 because 60 is close to 64.

6. $4.7^2 = 22.09$, which is very close to 22. Therefore $\sqrt{22} \approx 4.7$.

7. 78 is between $64 = 8^2$ and $81 = 9^2$. It is much closer to 81, so $\sqrt{78}$ rounds to 9.

8. $4.3^2 = 18.49$, which is greater than 18. Therefore 4.3 is a little too high, so $\sqrt{18} < 4.3$.

9. Estimate the square root first: $\sqrt{40}$ is about 6.3 because $6.3^2 = 39.69$. Then add 1.5 to get about 7.8.

10. Estimate the square root first: $\sqrt{13} \approx 3.6$ because $3.6^2 = 12.96$. Multiplying by 2 gives about 7.2.

11 The side length is $\sqrt{32} \approx 5.66$ inches. The perimeter is $4s$, so $4(5.66) \approx 22.6$ inches.

12 $\pi \approx 3.14$ and $\sqrt{5} \approx 2.24$. The sum is about 5.38, so 5.4 is closest.

13 The bases match and the operation is multiplication, so add exponents. $5 + 3 = 8$.

14 For same-base division, subtract exponents. $8 - 2 = 6$, so the quotient is x^6.

15 A power raised to a power means multiply exponents. $2 \cdot 3 = 6$, so the simplified power is 4^6.

16 A negative exponent means reciprocal. $3^{-3} = \frac{1}{3^3} = \frac{1}{27}$.

Week 2 Day 4: Graphing Proportional Relationships

Answers

1 4.5	2 2.5	3 3.5	4 Yes	5 Yes	6 No	7 $y = 4x$	8 A	9 Yes
10 No	11 27	12 $y = 15x$	13 The second cyclist	14 False	15 Store B	16 10		

Explanations

1 For $y = kx$, divide y by x. $18/4 = 4.5$, so the constant of proportionality is 4.5.

2 For a proportional relationship, the unit rate is y/x for any point on the line with $x \neq 0$. Using $(6, 15)$, $15/6 = 2.5$.

3 Divide y by x for each pair. $7/2 = 3.5$, $17.5/5 = 3.5$, and $28/8 = 3.5$.

4 The ratio y/x is always 4. Since the constant ratio is the same, the relationship is proportional with $y = 4x$.

5. The graph is a straight line through the origin. That means it can be written as $y = kx$, so it represents a proportional relationship.

6. The graph is a line, but it does not pass through the origin. A proportional relationship must go through $(0, 0)$.

7. Find the constant by dividing $y/x = 20/5 = 4$. A proportional equation has the form $y = kx$, so $y = 4x$.

8. Only $y = 7x$ has the form $y = kx$. The other equations have added or subtracted constants or no x-term.

9. The equation is in the form $y = kx$, with $k = 0.8$. Its graph would be a straight line through the origin.

10. The -5 means the graph has a nonzero y-intercept. A proportional relationship must have no added or subtracted constant.

11. Substitute $x = 12$ into $y = 2.25x$. $2.25(12) = 27$, so $y = 27$.

12. The unit rate is $45/3 = 15$ pages per minute. If x is minutes and y is pages, the equation is $y = 15x$.

13. The first cyclist travels 14 mph. The second cyclist travels $45/3 = 15$ mph, which is faster.

14. A proportional relationship must pass through $(0, 0)$. If $x = 0$, then $y = k(0) = 0$, not 5.

15. Store A costs $18/4 = \$4.50$ per pound. Store B costs $24/6 = \$4.00$ per pound, so Store B has the lower unit price.

16. First find the constant of proportionality from the point: $k = 6/9 = 2/3$. Then use $y = kx$, so $y = \frac{2}{3}(15) = 10$.

Week 6 Day 4: The Pythagorean Theorem

Answers

1 15 | 2 25 | 3 12 | 4 12 | 5 17 | 6 24 | 7 Yes | 8 No | 9 B

10 False | 11 No | 12 12 ft | 13 50 m | 14 11.4 ft | 15 10 | 16 26 cm

Explanations

1. Use $c^2 = 9^2 + 12^2 = 81 + 144 = 225$. Since $\sqrt{225} = 15$, the hypotenuse is 15.

2. Use $c^2 = 7^2 + 24^2 = 49 + 576 = 625$. The square root of 625 is 25.

3. Use $b^2 = 13^2 - 5^2 = 169 - 25 = 144$. The missing leg is $\sqrt{144} = 12$.

4. Use $b^2 = 20^2 - 16^2 = 400 - 256 = 144$. Therefore $b = 12$.

5. The legs are 8 and 15. $c^2 = 8^2 + 15^2 = 64 + 225 = 289$, so $c = 17$.

6. Subtract the known leg square from the hypotenuse square: $26^2 - 10^2 = 676 - 100 = 576$. The square root of 576 is 24.

7. The longest side is 26. Since $10^2 + 24^2 = 100 + 576 = 676 = 26^2$, the sides form a right triangle.

8. The longest side is 17. $8^2 + 14^2 = 64 + 196 = 260$, but $17^2 = 289$, so the converse is not satisfied.

9. Check the longest side as the hypotenuse. $6^2 + 8^2 = 36 + 64 = 100 = 10^2$, so $6, 8, 10$ forms a right triangle.

10. The hypotenuse is opposite the right angle and is always the longest side in a right triangle.

11. Use the longest side 13 as the possible hypotenuse. $9^2 + 9^2 = 162$, but $13^2 = 169$, so it is not right.

12 The ladder is the hypotenuse. $h^2 = 15^2 - 9^2 = 225 - 81 = 144$, so $h = 12$ ft.

13 The diagonal is the hypotenuse of a right triangle with legs 30 and 40. $30^2 + 40^2 = 2500$, so the diagonal is 50 m.

14 Use $c^2 = 3^2 + 11^2 = 130$. Then $c = \sqrt{130} \approx 11.4$ ft.

15 The horizontal change is 6, and the vertical change is 8. The distance is $\sqrt{6^2 + 8^2} = \sqrt{100} = 10$.

16 First the base diagonal is $\sqrt{6^2 + 8^2} = 10$. Then the space diagonal is $\sqrt{10^2 + 24^2} = \sqrt{676} = 26$ cm.

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