

Final Test — Form A

Answer key

8.NS

8.EE

8.F

8.G

8.SP

28 problems

1. Is $\sqrt{49}$ rational or irrational? Is $\sqrt{20}$ rational or irrational?

Answer $\sqrt{49}$ rational; $\sqrt{20}$ irrational

$\sqrt{49} = 7$, a whole number, so it is rational. 20 is not a perfect square, so $\sqrt{20}$ is irrational.

2. Evaluate the square root and the cube root: $\sqrt{81}$ and $\sqrt[3]{64}$.

Answer 9 and 4

$9^2 = 81$, so $\sqrt{81} = 9$. $4^3 = 64$, so $\sqrt[3]{64} = 4$.

3. Simplify using the properties of exponents. Write your answer with a positive exponent.

$$\frac{2^3 \cdot 2^4}{2^5}$$

Answer $2^2 = 4$

Add exponents on top, then subtract: $2^{3+4-5} = 2^2 = 4$.

4. Between which two consecutive whole numbers does $\sqrt{50}$ lie? Which one is it closer to?

Answer Between 7 and 8, closer to 7

$7^2 = 49$ and $8^2 = 64$, so $7 < \sqrt{50} < 8$. Since 50 is just above 49, it is closer to 7.

5. Write 5^{-2} as a fraction in simplest form.

Answer $\frac{1}{25}$

A negative exponent means the reciprocal: $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$.

6. Multiply and write the result in scientific notation.

$$(3 \times 10^4)(2 \times 10^{-7})$$

Answer 6×10^{-3}

Multiply the coefficients and add the exponents: $3 \times 2 = 6$ and $10^{4+(-7)} = 10^{-3}$, giving 6×10^{-3} .

7. Write 5,200,000 in scientific notation.

Answer 5.2×10^6

Move the decimal 6 places left to get 5.2: $5,200,000 = 5.2 \times 10^6$.

8. Which expression is equivalent to $\frac{x^5}{x^2}$?

Answer B) x^3

Subtract exponents when dividing like bases: $x^{5-2} = x^3$.

9. Does the table represent a function? Explain.

x	1	2	2	4
y	3	5	7	9

Answer No

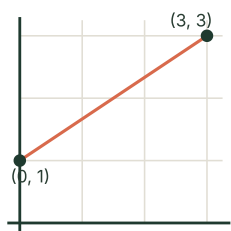
The input $x = 2$ pairs with two different outputs (5 and 7), so each input does not have exactly one output. It is not a function.

10. The function $f(x) = 3x - 5$ gives the number of laps a swimmer finishes after x practices. Find $f(4)$.

Answer 7

Substitute $x = 4$: $f(4) = 3(4) - 5 = 12 - 5 = 7$.

11. Find the slope of the line through the two marked points on the graph.



Answer $\frac{2}{3}$

$$\text{Slope} = \frac{\Delta y}{\Delta x} = \frac{3 - 1}{3 - 0} = \frac{2}{3}.$$

12. Solve for x : $\frac{x}{2} + 3 = 11$.

Answer $x = 16$

Subtract 3: $\frac{x}{2} = 8$. Multiply both sides by 2: $x = 16$.

13. Solve the multi-step equation: $3(2x - 4) = 2x + 4$.

Answer $x = 4$

Distribute: $6x - 12 = 2x + 4$. Subtract $2x$: $4x - 12 = 4$. Add 12: $4x = 16$, so $x = 4$.

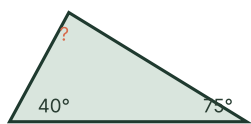
14. Find the slope and y -intercept of the line, then write the equation $y = mx + b$.

x	0	1	2
y	50	75	100

Answer $y = 25x + 50$

The y -value rises 25 for each +1 in x , so the rate of change is $m = 25$. At $x = 0$, $y = 50$, so $b = 50$. Thus $y = 25x + 50$.

15. Two angles in the triangle measure 40° and 75° . Find the measure of the third angle.



Answer 65°

The angles of a triangle sum to 180° : $180 - 40 - 75 = 65^\circ$.

16. Reflect the point $(3, 4)$ across the y -axis. Give the coordinates of the image.

Answer $(-3, 4)$

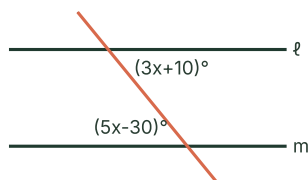
Reflecting across the y -axis negates x and keeps y : $(3, 4) \rightarrow (-3, 4)$.

17. Which point is the image of $(4, 2)$ after a rotation of 90° counterclockwise about the origin?

Answer B) $(-2, 4)$

A 90° counterclockwise rotation sends $(x, y) \rightarrow (-y, x)$, so $(4, 2) \rightarrow (-2, 4)$.

18. Lines ℓ and m are parallel and cut by a transversal. The marked angles are alternate interior angles. Solve for x .



Answer $x = 20$

Alternate interior angles are equal: $3x + 10 = 5x - 30$. Then $40 = 2x$, so $x = 20$.

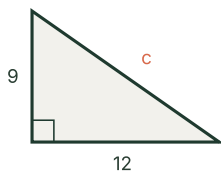
19. Solve the system of equations.

$$\begin{cases} y = 2x - 1 \\ x + y = 5 \end{cases}$$

Answer $(2, 3)$

Substitute $y = 2x - 1$ into $x + y = 5$: $x + (2x - 1) = 5$, so $3x = 6$ and $x = 2$. Then $y = 2(2) - 1 = 3$.

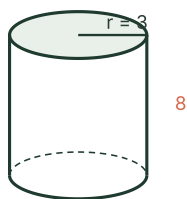
20. A right triangle has legs of length 9 and 12. Find the length of the hypotenuse.



Answer 15

By the Pythagorean theorem, $c^2 = 9^2 + 12^2 = 81 + 144 = 225$, so $c = \sqrt{225} = 15$.

21. Find the volume of the cylinder in terms of π .



Answer 72π cubic units

Volume $= \pi r^2 h = \pi(3)^2(8) = 72\pi$ cubic units.

22. A cone-shaped cup has radius 6 cm and height 10 cm. Find its volume in terms of π .

Answer 120π cubic cm

$$\text{Volume} = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(6)^2(10) = \frac{1}{3}\pi(360) = 120\pi \text{ cubic cm.}$$

23. A ball has radius 3 in. Find the volume of the sphere in terms of π .

Answer 36π cubic in

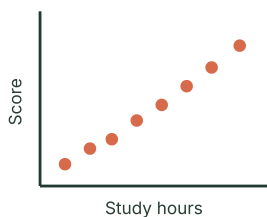
$$\text{Volume} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(3)^3 = \frac{4}{3}\pi(27) = 36\pi \text{ cubic in.}$$

24. Find the length of the leg labeled b in simplest radical form, given the hypotenuse is $\sqrt{52}$ and one leg is 6.

Answer $b = 4$

By the Pythagorean theorem, $6^2 + b^2 = (\sqrt{52})^2 = 52$, so $b^2 = 52 - 36 = 16$ and $b = 4$.

25. The scatter plot compares hours spent studying to test scores for several students. Describe the association (positive, negative, or none) and the strength.



Answer Strong positive linear association

As study hours increase, scores increase, so the association is positive. The points lie close to a straight line, so it is a strong, roughly linear association.

26. At a school basketball game, adult tickets cost \$8 and student tickets cost \$5. The booster club sold 30 adult tickets and 45 student tickets. How much money did they collect in all?

Answer \$465

Adults: $8 \times 30 = \$240$. Students: $5 \times 45 = \$225$. Total = $240 + 225 = \$465$.

27. The school pep band uses two text plans. Plan A charges a \$20 flat fee plus \$0.10 per text. Plan B charges \$0.30 per text with no flat fee. For how many texts do the two plans cost the same, and what is that cost?

Answer 100 texts, costing \$30

Set the costs equal: $20 + 0.10t = 0.30t$. Then $20 = 0.20t$, so $t = 100$ texts. Cost = $0.30(100) = \$30$.

28. A ladder leans against the school gym wall. The foot of the ladder is 5 ft from the wall and the ladder is 13 ft long. How high up the wall does the ladder reach?

Answer 12 ft

The ladder, wall, and ground form a right triangle: $5^2 + h^2 = 13^2$, so $h^2 = 169 - 25 = 144$ and $h = \sqrt{144} = 12$ ft.