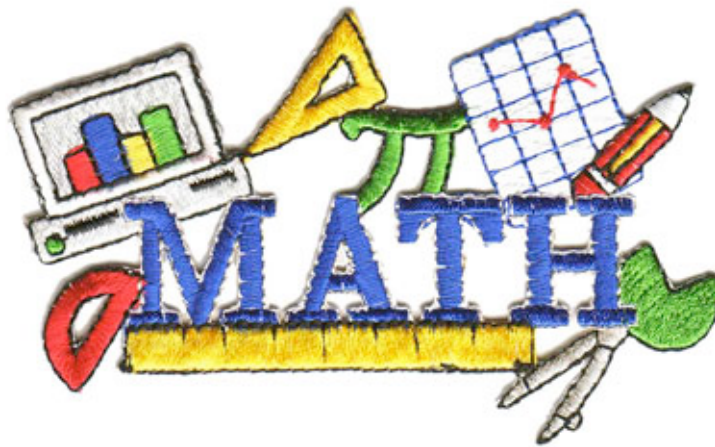


# 8th Grade Math

## Benchmark 1

# Parent Handbook



*This handbook will help your child review material learned this quarter, and will help them prepare for their first Benchmark Test. Please allow your child to work independently through the material, and then you can check their work using the answer key in the back of the handbook. If you have any questions or concerns about this material, please contact your child's teacher.*

*Thank you for your support.*

# Eighth Grade Benchmark #1

## Math Essential Standards

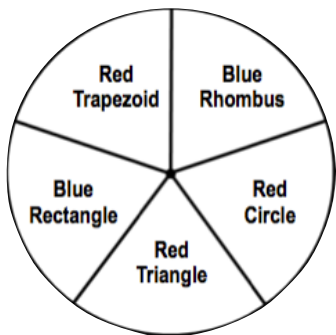
### Learning Objective #1:

 "Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation." (8.M.SP.B.05)

### Practice:

1. There are 5 purple pens, 4 blue pens, 3 red pens, and 6 black pens in a pen holder. Two pens are selected and pens are replaced. What is the probability of selecting a blue pen and then a red pen?
  - a.  $\frac{2}{51}$
  - b.  $\frac{2}{54}$
  - c.  $\frac{1}{27}$
  - d.  $\frac{3}{54}$
2. A box of yogurt has 12 individual packages with 3 of each flavor: strawberry, blueberry, banana, and vanilla. If Serenity and her friend each want one, what is the probability they will both get their favorite flavor of strawberry?

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3. Using the spinner, what is the probability of first spinning a blue, and then spinning a quadrilateral?



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

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

c.  $\frac{6}{25}$

d.  $\frac{3}{25}$

**Learning Objective #2:**

 **“Understand and apply the properties of integer exponents to generate equivalent numerical expressions.” (8.M.EE.A.01)**

**Practice:**

4. Simplify the following expression:  $4^3 \cdot 5^3$

- a. 180
- b. 8000
- c. 400
- d. 4000

5. Simplify the following expression:  $5^{-2} \cdot 5^4$

- a. 125
- b. 625
- c. 25
- d. -25


6. Simplify the following expression:  $\frac{4^4}{4^2}$

- a. 4
- b. 16
- c.  $\frac{1}{4}$
- d. -16

7. Simplify the following expression:  $a^{-4}$

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**Learning Objective #3:**

 **“Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.” (8.M.EE.A.04)**

**Practice:**

8. Convert to scientific notation: 97 million

- a.  $9.7 \times 10^7$
- b.  $97 \times 10^7$
- c.  $9.7 \times 10^6$
- d.  $97 \times 10^6$

9. Convert to standard notation:  $6.3 \times 10^{-5}$

- a. 6,300,000
- b. 630,000
- c. 0.000063
- d. 0.0000063

10.  $8.2 \times 10^6$   
 $4.0 \times 10^1$

- a.  $20.5 \times 10^6$
- b.  $32.8 \times 10^4$
- c.  $2.05 \times 10^4$
- d.  $2.05 \times 10^5$


11.  $(3 \times 10^4) + (5 \times 10^6)$

- a.  $5.03 \times 10^6$
- b.  $15 \times 10^{10}$
- c.  $8 \times 10^{10}$
- d.  $5.3 \times 10^2$

12. Multiply and answer in scientific notation:  $(2.5 \times 10^7)(2 \times 10^3)$

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**Learning Objective #4:**

 **“Use square root and cube root symbols to represent solutions to equations of the form  $x^2 = p$  and  $x^3 = p$ , where  $p$  is a positive rational number. Know that  $\sqrt{2}$  is irrational. (a) evaluate square roots of perfect squares less than or equal to 225. (b) Evaluate cube roots of perfect cubes less than or equal to 1000.” (8.M.EE.A.02)**

**Practice:**

13. Simplify  $\sqrt{\frac{25}{144}}$

a.  $\frac{5}{12}$

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

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

d.  $\frac{3}{4}$

14. Simplify  $\sqrt[3]{x} + \sqrt[4]{y}$  when  $x = 27$  and  $y = 16$

a. 13

b. 10

c. 5

d. 17

15. Mike is building a cube-shaped Hope Chest for his daughter who is getting married this summer. The total volume of the box is 125 feet cubed. What are the dimensions of each side of the Hope Chest?

a. 15 feet

b. 5 feet


c. 25 feet

d. 10 feet

16. Sue wants to lay a square mat under her weight set to protect the floor. If the area of the mat is 36 feet squared, what is the length of the side?

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*Learning Objective #5:*

 **“Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world context and mathematical problems in two and three dimensions.” (8.M.G.B.07)**

*Practice:*

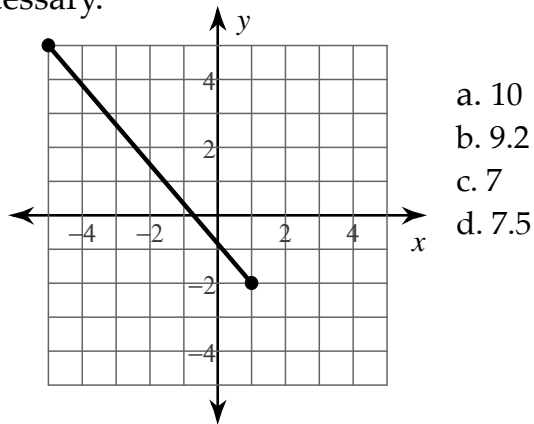
17. The bottom of a ladder must be placed 3 feet from a wall. The ladder is 12 ft. long. About how far above the ground does the ladder touch the wall?
- a. 12.4 feet
  - b. 10 feet
  - c. 11.6 feet
  - d. 15 feet
18. Two joggers run 8 miles north and then 5 miles west. What is the shortest distance, to the nearest tenth of a mile, they must travel to return to their starting point?
- a. 6.4 miles
  - b. 9.4 miles
  - c. 2.5 miles
  - d. 94 miles
19. A soccer field is a rectangle 90 meters wide and 120 meters long. If you were asked to run from one corner to the other corner diagonally across, what is the distance?
- a. 150 meters
  - b. 1500 meters
  - c. 15 meters
  - d. 200 meters
20. An isosceles triangle has congruent sides of 20 cm. The base is 10 cm. Estimate the height of the triangle to the nearest tenth of a centimeter.
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**Learning Objective #6:**

**📌 “Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.” (8.M.G.B.08)**

**Practice:**

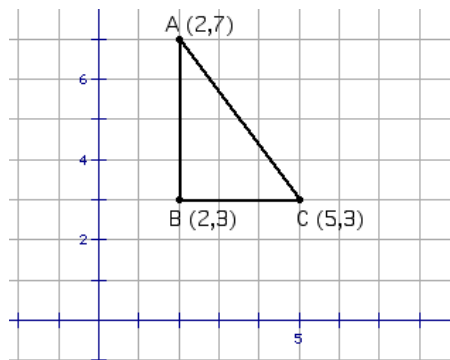
21. Find the distance between the two points on the graph. Round to the nearest tenth if necessary.



22. Find the distance between the two points  $(5, 9)$ ,  $(-7, -7)$ . Round to the nearest tenth if necessary.


- a. 12
- b. 11.5
- c. 20
- d. 16

23. What is the distance of  $\overline{AC}$ ? Round to the nearest tenth if necessary.



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**Learning Objective #7:**

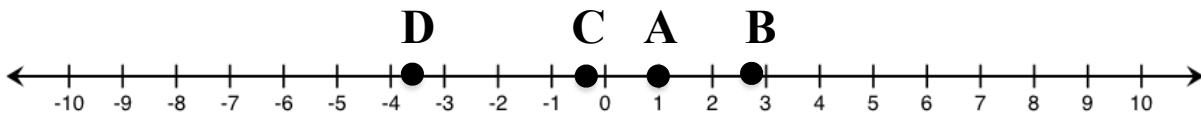
 **“Use rational approximations of irrational numbers to compare the size of irrational numbers. Locate them approximately on a number line diagram, and estimate the values.” (8.M.NS.A.02)**

**Practice:**

24.  $\sqrt{50}$  is between \_\_\_\_\_ and \_\_\_\_\_.

25.  $\sqrt{130}$  is between \_\_\_\_\_ and \_\_\_\_\_.

**Identify the point closest to the following numbers:**



26. 275% \_\_\_\_\_

27.  $-\frac{6}{16}$  \_\_\_\_\_

28.  $15^0$  \_\_\_\_\_

29.  $-\sqrt{12}$  \_\_\_\_\_



# Benchmark 1 Essential Math Vocabulary

- ◆ **probability** - The measure of the likelihood of the occurrence of an event.
- ◆ **compound probability** - An event that includes two or more independent events.
- ◆ **independent events** - Two events in which the outcome of the second event is not affected by the outcome of the first event.
- ◆ **dependent events** - Two events in which the outcome of the second event is affected by the outcome of the first event.
- ◆ **exponent** - a number placed to the right of and above a non-zero base that indicates how many times the base is used as a repeating factor; a zero exponent is equal to one.
- ◆ **expression** - a mathematical phrase containing one or more terms linked by operation symbols.
- ◆ **scientific notation** - a form of writing a number expressed as a power of 10 and a decimal number greater than or equal to one and less than ten.
- ◆ **standard notation** - a number written with one digit for each place value in base ten.
- ◆ **radical** - the symbol that is used to indicate square roots, cube roots, etc.
- ◆ **radical root** - one of the two equal factors of a number.
- ◆ **cube root** - one of only three factors of a given number.
- ◆ **irrational number** - any real number that cannot be expressed as a ratio between two integers.
- ◆ **pythagorean theorem** - the statement that in a right triangle, the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse ( $a^2+b^2=c^2$ ).
- ◆ **right triangle** - a triangle the contains a 90 degree angle.
- ◆ **hypotenuse** - the longest of three sides of a right triangle; the side opposite the right angle in a right triangle.
- ◆ **leg of a triangle** - either of the two shorter sides of a right triangle. These two sides together form the right angle in the right triangle.

- ◆ **distance formula** - the distance formula is used to determine the distance,  $d$ , between two points. If the coordinates of the two points are  $(x_1, y_1)$  and  $(x_2, y_2)$ , the distance formula is  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- ◆ **coordinate plane** - A plane formed by the intersection of a horizontal number line called the x-axis and a vertical number line called the y-axis.
- ◆ **coordinate points** - A pair of numbers that describe the position of a point on a coordinate plane by using the horizontal and vertical distances from the two reference axes.
- ◆ **coincident lines** - two lines or shapes that lie exactly on top of each other.
- ◆ **point of intersection** - lines cross or intersect at exactly one point. This point gives the solution for the system of equations.
- ◆ **collinear** - three or more points that lie on the same straight line.
- ◆ **irrational number** - any real number that cannot be expressed as a ratio between two integers.
- ◆ **compare** - estimate, measure, or note the similarity or dissimilarity between values.
- ◆ **estimate** - to form an approximate idea; calculate roughly.
- ◆ **exponent** - a number placed to the right of and above a non-zero base that indicates how many times the base is used as a repeating factor; a zero exponent is equal to one.
- ◆ **square (exponent)** - the result of multiplying a number by itself.
- ◆ **simplify** - reduce to lowest terms.
- ◆ **congruent** - same shape and same size; equal
- ◆ **evaluate** - to find the numerical value of a mathematical expression.

# Math ANSWER KEY

1. C
2.  $\frac{1}{22}$
3. C
4. B
5. C
6. B
7.  $\frac{1}{a^4}$
8. A
9. C
10. D
11. A
12.  $5 \times 10^{10}$
13. A
14. C
15. B
16. 6 feet
17. C
18. B
19. A
20. 19.4 cm
21. B
22. C
23. 5
24. 7 & 8
25. 11 & 12
26. B
27. C
28. A
29. D