THIRD SPACE LEARNING

6th Grade Math Problems

34 6th Grade Math Problems With Answers And Worked Examples

6th grade

How to use this resource

Here is a collection of sixth grade math problems organized by concepts, including math word problems and reasoning problems. Each problem has an answer key, a worked example and a detailed explanation of how to answer the question.

These are suitable for use as:

- Additional practice before an assessment
- A Do Now activity
- An Exit Slip to check for understanding after a lesson

Ratios and Proportional Relationships

1. Determine if each pair of ratios forms a proportion.

a $\frac{4}{2}$ and $\frac{30}{6}$

b $\frac{3}{2}$ and $\frac{18}{6}$

c $\frac{4}{3}$ and $\frac{20}{15}$

d $\frac{6}{18}$ and $\frac{1}{3}$

Answer:

○ no ○ no ○ yes ○ yes

2. Solve each proportion.

a $\frac{x}{2} = \frac{30}{6}$

b $\frac{15}{45} = \frac{2}{x}$

c $\frac{12}{5} = \frac{x}{10}$

d $\frac{7}{8} = \frac{56}{x}$

Answer:

○ $x = 10$ ○ $x = 6$ ○ $x = 24$ ○ $x = 64$

3. A recipe requires 2 cups of flour for every 3 cups of sugar.
If you want to make a double batch of the recipe, how much flour do you need?

Answer:

○ $\frac{2\ c\ \text{flour}}{3\ c\ \text{sugar}} \times \frac{2}{2} = \frac{4\ c\ \text{flour}}{6\ c\ \text{sugar}}$

4 cups of flour

Ratios and Proportional Relationships

4. A restaurant orders cans of black beans and cans of pinto beans. The ratio of the number of black beans to pinto beans is 2:3. What is the ratio of pinto beans to all beans?

a 3:8

b 3:5

c 2:8

d 2:5

Answer:

Given: 2 black + 3 pinto = 5 total

$$2:3 = \frac{2 \text{ black}}{3 \text{ pinto}} \text{ and } \frac{3 \text{ pinto}}{5 \text{ all}} = 3:5$$

5. Samir bought gas for his car.
   - Gas cost $3.45 per gallon.
   - Samir bought 11.5 gallons.

   What was the total cost for Samir's gas?

Answer:

$$\frac{\$3.45}{1 \text{ gallon}} = \frac{X \text{ dollars}}{11.5 \text{ gallons}}$$

$$\frac{\$3.45}{1 \text{ gallon}} \times \frac{11.5}{11.5} = \frac{\$39.675}{11.5 \text{ gallons}}$$

He spend $39.68 on 11.5 gallons of gas

Ratios and Proportional Relationships

6. Ed and Jim are debating the answer to the equation $\frac{2}{3}m = \frac{1}{4}$.

- Jim states that m is equal to $2\frac{2}{3}$.
- Ed states that m is equal to $\frac{3}{8}$.

Which statement is true?

a Jim's answer of $2\frac{2}{3}$ is correct because he divided $\frac{2}{3}$ by $\frac{1}{4}$ to get his answer.

b Jim's answer of $2\frac{2}{3}$ is correct because he divided $\frac{1}{4}$ by $\frac{2}{3}$ to get his answer.

c Ed's answer of $\frac{3}{8}$ is correct because he multiplied $\frac{1}{4}$ by $\frac{2}{3}$ to get his answer.

d Ed's answer of $\frac{3}{8}$ is correct because he divided $\frac{1}{4}$ by $\frac{2}{3}$ to get his answer.

Answer:

○ d) is true

$$\frac{\frac{2}{3}m}{\frac{2}{3}} = \frac{\frac{1}{4}}{\frac{2}{3}}$$

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

$$m = \frac{3}{8}$$

Ratios and Proportional Relationships

7. There are 4 cats for every 5 dogs in the pet store. How many cats and dogs could be in the pet store?

a 64 cats and 80 dogs

b 72 cats and 73 dogs

c 84 cats and 100 dogs

d 96 cats and 110 dogs

Answer:

○ $\frac{4}{5} \times \frac{2}{2} = \frac{8}{10} \times \frac{2}{2} = \frac{16}{20} \times \frac{2}{2} = \frac{32}{40} \times \frac{2}{2} = \frac{64}{80}$

The Number System

8. a (-2) + (-8)

b (-3) - 7 + (-11)

c $-1000 \div 10^3$

Answer:		
= -2-8 = -10	= -3-7-11 = -21	= -1000 ÷ 1000 = -1

9. Add an inequality sign to show which number is greater.

a (-6) ___ (-7)

b -8 ___ 9

c 67 ___ 84

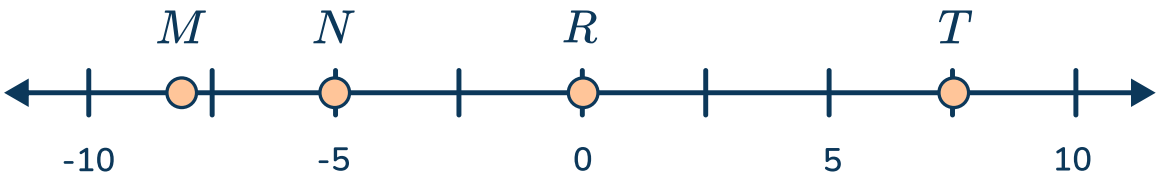
d -72 ___ -8

e 3 ___ -14

Answer:				
>	<	<	<	>

The Number System

10. What is the value of T on the number line?



a 5.5

c 7.5

b 6

d 9

Answer:

c) 7.5

Reasoning: Students need to estimate the value of each dash to determine the number represented on the number line. The number must fall between 5 and 10 which eliminates choice a and b; but 9, choice d, would be situated much closer to 10. The correct answer is c, 7.5.

The Number System

11. Which of the following numbers is greater than all the numbers in the list below?

$$-3.25, \quad -\frac{7}{2} \quad -3.1, \quad -3\frac{1}{3}$$

a -3.25

c -3.1

b $-\frac{7}{2}$

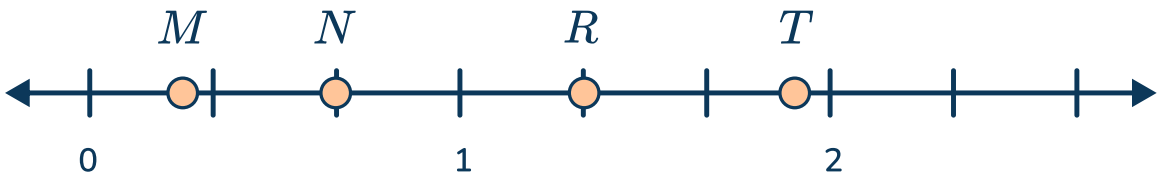
d $-3\frac{1}{3}$

Answer:

C) -3.1

Reasoning: Understanding that negative numbers are greater when they are smaller due to them being closer to 0. Thus, -3.25 can be eliminated immediately because -3.1 is greater. Converting $-\frac{7}{2}$ =-3.5 so it can be eliminated as it is less than -3.1. Last, compare $-3\frac{1}{3}$ as a decimal is -3.333 which is also less than -3.1. Therefore, c, -3.1 is the correct answer.

12. Which point shows the location of $\frac{4}{3}$ on the number line?



a Point M

c Point R

b Point N

d Point T

Answer:

c) Point R

Reasoning: Looking at the numberline, students should recognize that each full point is broken into three sections. Thus, the individual lines can be counted as: 0, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$ = 1, $\frac{4}{3}$, $\frac{5}{3}$ ... Therefore, R is $\frac{4}{3}$

The Number System

13. Which list of numbers is ordered from greatest to least?

a $1.5, \frac{2}{3}, -\frac{3}{4}, -1.2$

b $1.5, -1.2, \frac{2}{3}, -\frac{3}{4}$

c $\frac{2}{3}, 1.5, -1.2, -\frac{3}{4}$

d $\frac{2}{3}, 1.5, -\frac{3}{4}, -1.2$

Answer:

○ a) $1.5, \frac{2}{3}, -\frac{3}{4}, -1.2$

Reasoning: Logically, negative numbers are smaller than positive numbers, thus, option b can be eliminated immediately. Understanding that when the numerator is smaller than the denominator you have a decimal less than one whole, students can eliminate option c and d as $\frac{2}{3} < 1.5$. The correct answer is a.

14. Sarah was hiking in the mountains. She started her hike at an elevation of 800 meters above sea level. She climbed up 250 meters to reach a peak and then descended 450 meters to a valley. What is her elevation at the valley?

Answer:

○ $800 + 250 - 450 = 600$

Sarah is 600 meters above sea level.

Expressions and equations

15. Evaluate the expression:

a $(5^2 - 10) \div 5 \bullet 2^3$

b $-3x = 48$

c $\frac{1}{3}x = 9\frac{1}{3}$

Answer:

○ $= (25 - 10) \div 5 \bullet 8$

$= (15) \div 5 \bullet 8$

$= 3 \bullet 8$

$= 24$

○ $\frac{-3x}{-3} = \frac{48}{-3}$

$x = -16$

○ $\frac{1}{3}x = \frac{28}{3}$

$\frac{\frac{1}{3}x}{\frac{1}{3}} = \frac{\frac{28}{3}}{\frac{1}{3}}$

$x = \frac{28}{3} \bullet \frac{3}{1}$

$x = 28$

16. Sebastian pays $250 each month to rent an office where he earns $35 per hour tutoring students. Which equation represents Sebastian's profit, y, for working x hours?

a $y = 35 + 250x$

b $y = 35x + 250$

c $y = 35 - 300x$

d $y = 35x - 250$

Answer:

○ d) $y = 35x - 250$

Reasoning: The starting amount he must pay is $250. The "per hour" implies multiplication as "per" means "to multiply." Thus, the x must be multiplied by 35. Lastly, understanding that profit is determined by subtracting away expenses from any income forces the elimination of choices a and b. The correct answer is d, $y = 35x - 250$.

Expressions and equations

17. Kedar runs the same number of miles, x, every week. His total distance run over the week is less than 60 miles. Which inequality represents how many miles Kedar runs each week?

a $x \geq 60$

c $x > 60$

b $x \leq 60$

d $x < 60$

Answer:

d) $x < 60$

Reasoning: The original problem states "less than 60" so students should recognize the need to plug in a number for the variable x to ensure the possible answer makes logical sense. Use 50, which is less than 60, and you can eliminate choice a and b. The determining factor is the number 60. Is "60 less than 60" or is "60 less than or equal to 60". The problem wanted "less than," thus, the correct answer is d.

18. What is the value of $(5p + \frac{1}{4})^2$ when $p = 0$?

Answer:

$(5p + \frac{1}{4})^2$

$(5(0) + \frac{1}{4})^2$

$(\frac{1}{4})^2$

$\frac{1}{16}$

Expressions and equations

19. During a weekend special event, the manager of a bookstore gave away gift cards to every 75th person who visited the mall.
    - On Saturday, 2,100 people visited the mall.
    - On Sunday, 1,675 people visited the mall.

    How many people received gift cards?

Answer:

○ The manager gave away 50 gift cards.

Reasoning: To determine how many gift cards are given away, the student must recognize that the problem involves the need to divide the total number of people into groups of 75.

$$\frac{\text{total people}}{75} = \text{number of gift cards given away}$$

$$\frac{2100 + 1675}{75}$$

$$\frac{3775}{75} = 50.\overline{3333}$$

The manager gave away 50 gift cards.

Expressions and equations

20. Maria is saving money to buy a new bicycle. She has already saved $45. Each week, she earns $15 from her allowance and an additional $10 from doing extra chores. She plans to save all of this money every week. How many weeks will it take for Maria to have at least $300 saved?

Answer:

Step 1: Calculate how much Maria saves each week.

$15 + 10 = 25$ dollars per week

Step 2: Set up an expression for the total amount saved after weeks.

$45 + 25w$

Step 3: Determine the number of weeks required for Maria to have at least $300 saved.

$45 + 25w \geq 300$

Step 4: Solve inequality.

$45 + 25w \geq 300$

$-45 \qquad -45$

$25w \geq 255$

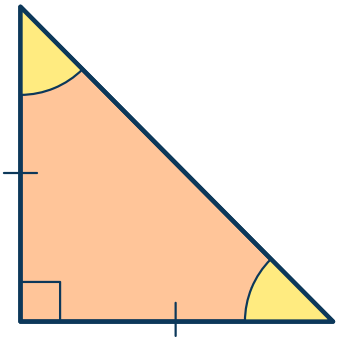
$$\frac{25w}{25} \geq \frac{255}{25}$$

$w \geq 10.2$

Since Maria can't save for a fraction of a week, she will need to save for at least 11 weeks to have at least $300.

Geometry

21. What is the area of the triangle rounded to the nearest hundredth?



3.5 inches

Answer:

- $A = \frac{1}{2}bh$

$A = \frac{3.5 \bullet 3.5}{2}$

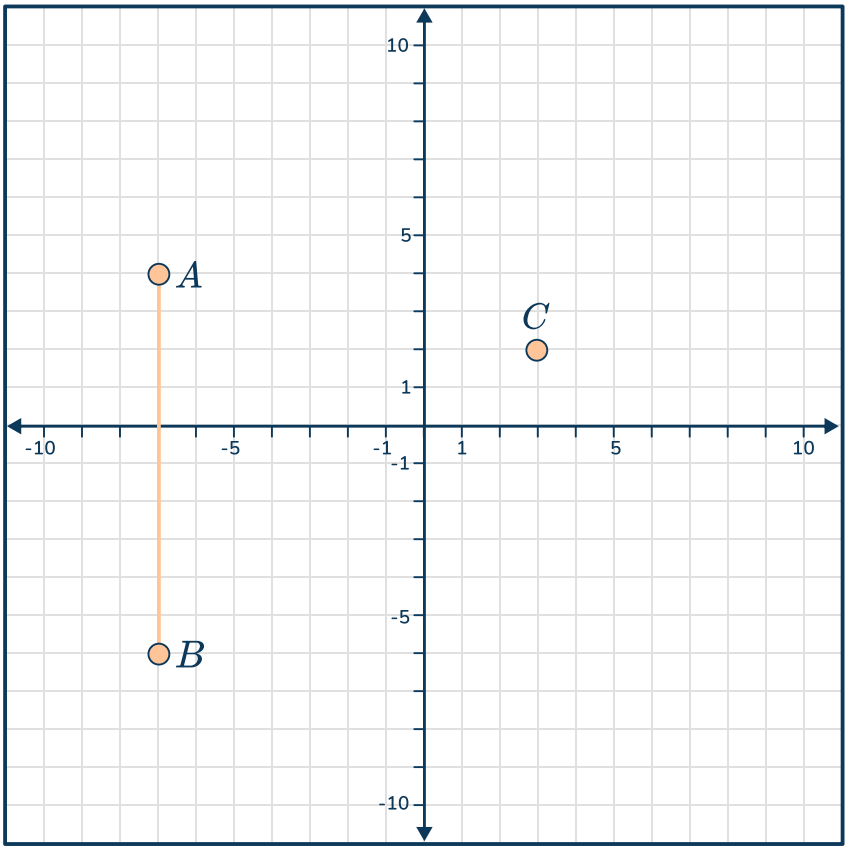
$A = \frac{12.25}{2}$

$A = 6.125$

$A = 6.13 \text{ in}^2$

Geometry

22. The graph shows segment AB and Point C



- Point M is located in the fourth quadrant.
- The distance between point C and point M is half the distance between point A and point B.
- Segment CM is parallel to segment AB.

What is the ordered pair of point M ?

a (7, 2)

c (-3, 2)

b (2, 7)

d (3, -3)

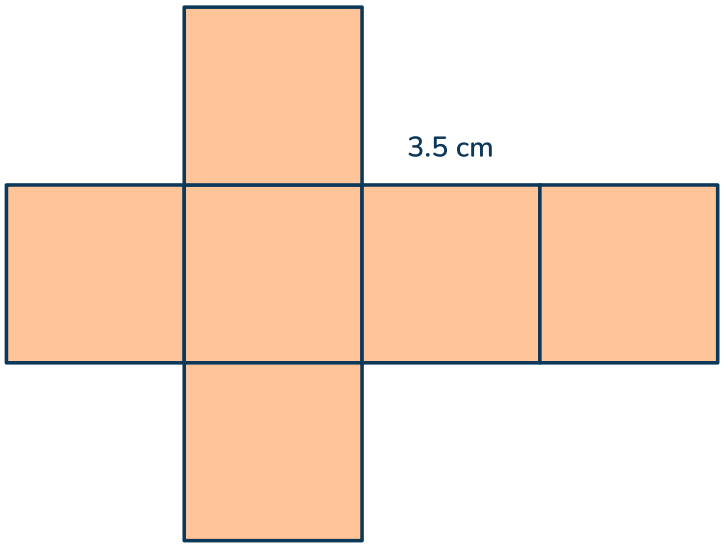
Answer:

d) (2, -3)

Reasoning: Quadrant four is the lower right hand quadrant without any existing points. Thus, the student would count line segment AB and determine the length is 10 units. Since half of 10 is 5, the student would count 5 unit down from point C to point (3, -3)

Geometry

23. Suzy is wrapping a cube-shaped box and wants to make sure she has enough wrapping paper. The net for the box is shown.



What is the area she needs to cover?

a 73.5 cm^2

c 42 cm^2

b 21 cm^2

d 96.25 cm^2

Answer:

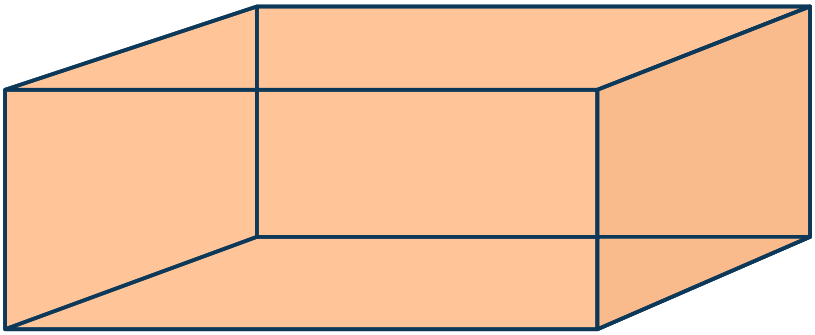
a) 3.5cm × 3.5cm × 6 = 73.5cm^2

Reasoning: Students need to remember that surface area can be solved by adding the area of each shape. Since this is a cube, there are six identical sides. Area of a square is solved by multiplying length times width. Then, multiply that area times 6.

3.5cm × 3.5cm × 6 = 73.5cm^2

Geometry

24. How much water can Sier hold in his fish tank if it has a length of 4 feet, a width of 3 feet, and a height of 5 feet?



Answer:

- $V = 60$ feet^3

Solution: Students should recognize this as a rectangular prism and now that volume is the term related to how much something can hold. Therefore, the correct answer is:

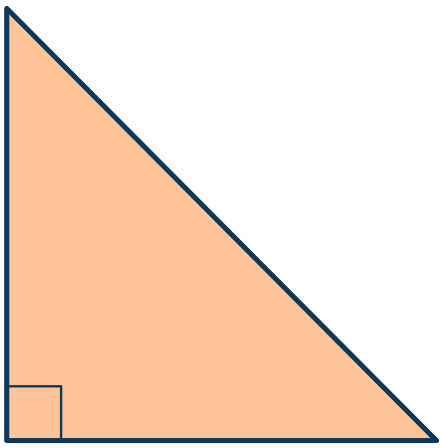
$V = L \times W \times H$

$V = 4$ feet $\times$ 3 feet $\times$ 5 feet

$V = 60$ feet^3

Geometry

25. Calculate the length of the hypotenuse of a right triangle with legs measuring 6 cm and 8 cm.



Answer:

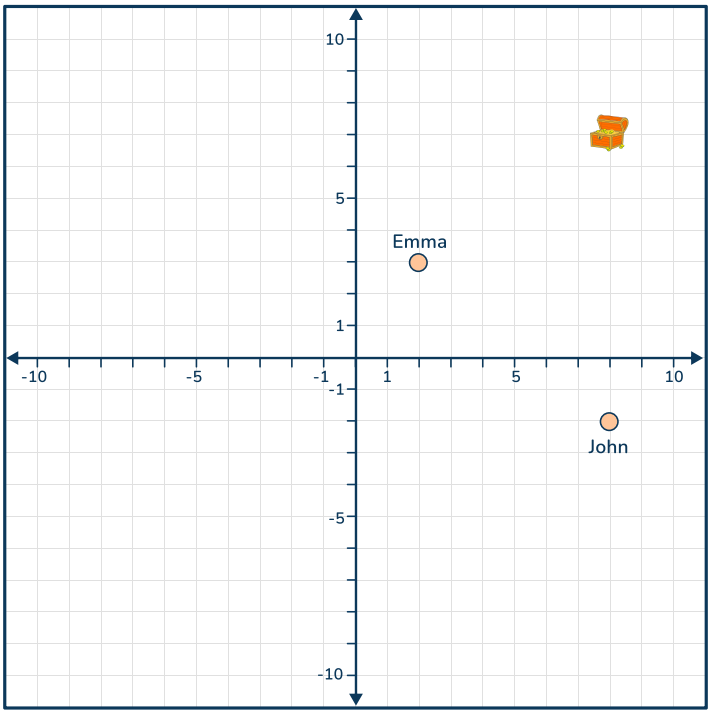
- 10 cm

Solution: Students will remember that the hypotenuse is the side opposite of the right angle and c in the pythagorean theorem. Thus, 6 and 8 are the sides that form the right angle and used for variables a and b. Then, students will use the pythagorean theorem to solve for the hypotenuse.

$a^2 + b = c^2$
$(6)^2 + (8)^2 = c^2$
$36 + 64 = c^2$
$100 = c^2$
$\sqrt{100} = \sqrt{c^2}$
$10 = c$

Geometry

26. Emma and John are playing a treasure hunt game on a coordinate plane. Emma's starting point is at (2,3) and John's starting point is at (8, -2). They both move to the treasure located at (8,7).



1. Calculate the distance Emma travels to reach the treasure.
2. Calculate the distance John travels to reach the treasure.
3. Determine who travels the longer distance.

Answer:

Step 1: Calculate Emma's distance using the pythagorean theorem by first creating a right triangle where the 90° angle would be at (8,3); therefore 6 units right and 4 units up to the treasure.

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

$(6)^2 + (4)^2 = c^2$

$36 + 16 = c^2$

$52 = c^2$

$52 = c^2$

$7.21 \approx c$

Step 2: Calculate John's distance to the treasure. Because it is a straight line, students can determine he is 9 units from the treasure.

Step 3: John will travel further.

Statistics and probability

27. If the probability of picking a red marble from a bag is $\frac{1}{4}$, what is the probability of not picking a red marble?

a $\frac{1}{2}$

c $\frac{3}{4}$

b $\frac{1}{4}$

d $\frac{1}{3}$

Answer:

c) $\frac{3}{4}$

Reasoning: The odds of an event occurring and the odds of the event not occurring must add up to 100% or 1 whole. Thus, if picking a red marble is $\frac{1}{4}$, then you subtract $\frac{1}{4}$ from 1 to determine the probability of the event not occurring.

not occuring + occurring = 1

$$X + \frac{1}{4} = 1$$

$$-\frac{1}{4} \qquad -\frac{1}{4}$$

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

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

Statistics and probability

28. The following data set represents the number of books read by students in a class over a one month period of time: 3, 5, 8, 3, 6, 7, 3, 9, 5, 4.
    - Find the mean.
    - Find the median.
    - Find the mode.
    - Find the range.

Answer:

Mean = 5.3

Reasoning: Mean is the average of the numbers. Add them all and divide by 10 because there are 10 numbers in the set.

$$\frac{3+5+8+3+6+7+3+9+5+4}{10} = \frac{53}{10} = 5.3$$

Median = 5

Reasoning: Ordered data= 3, 3, 3, 4, 5, 5, 6, 7, 8, 9.

The middle two numbers are 5 and 5. Thus, take the average.

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

Mode = 3

Reasoning: This is the number that repeats most often.

Range = 6

Subtract the lowest number from the highest to determine range.

9 - 3 = 6

Statistics and probability

29. The table below shows the number of hours students spend on homework per week:

Hours	Frequency
0-2	4
3-5	6
6-8	8
9-11	2

a What is the total number of students surveyed?

b What is the most common range of hours spent on homework?

Answer:

a) Total number of students: 4 + 6 + 8 + 2 = 20
b) Most common range (mode): 6 - 8 hours

30. A jar contains 10 red, 15 blue, and 5 green marbles. If one marble is selected at random:

a What is the probability of selecting a blue marble?

b What is the probability of selecting a red or green marble?

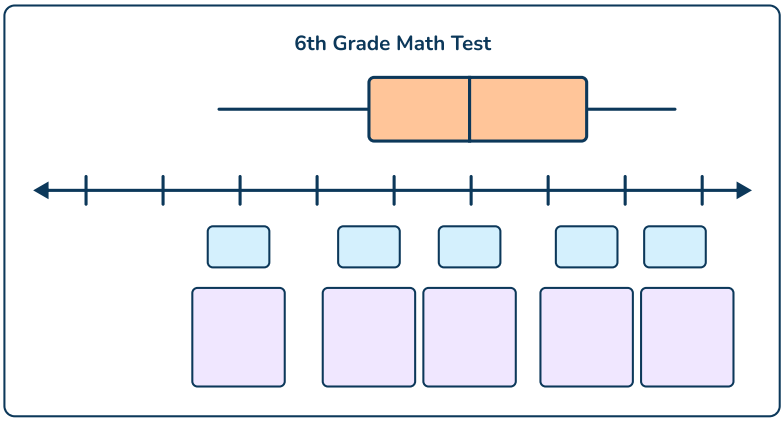
Answer:

a) Probability of selecting a $\frac{\text{blue}}{\text{total \# marbles}} = \frac{15}{10 + 15 + 5} = \frac{15}{30} = \frac{1}{2}$

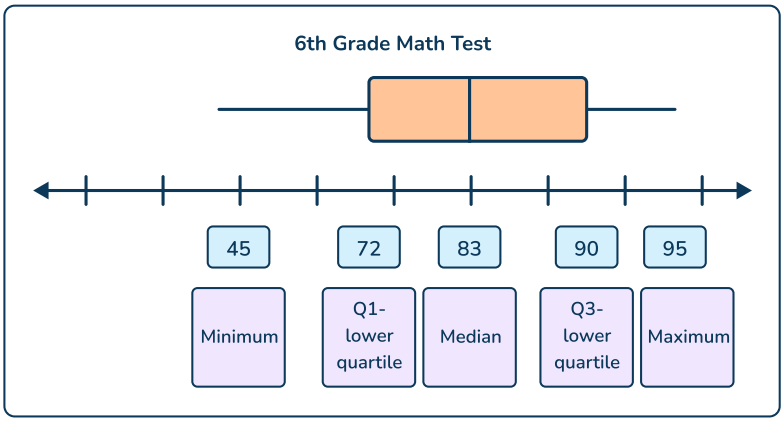
b) Probability of selecting a $\frac{\text{red + green}}{\text{total \# marbles}} = \frac{15}{30} = \frac{1}{2}$

Statistics and probability

31. The following numbers represent the scores of 10 students on a math test:
45, 67, 72, 78, 81, 85, 88, 90, 92, 95.
Fill in the box and whisker plot labeling the median, lower quartile (Q1), upper quartile (Q3), the minimum and maximum numbers and enter their values.



Answer:



Solution:

Step 1: Order the numbers from low to high. 45, 67, 72, 78, 81, 85, 88, 90, 92, 95

Step 2: Determine the location of the following words: minimum, lower quartile, median, upper quartile, maximum.

Step 3: Determine the minimum and maximum values and place in the first and last blue box.

Step 4: Solve for the median by determining the number in the middle = 83

Step 5: Solve for the median of the lower half of the data set (lower quartile) by listing the first half of the numbers from low to high: 45, 67, 72, 78, 81. The median is 72 (the number in the middle).

Step 6: Solve for the median of the upper half of the data set (upper quartile) by listing the second half of the numbers from low to high: 85, 88, 90, 92, 95. The median is 90 (the number in the middle).

Statistics and probability

32. Rosa is going to survey her classmates to find out if more students walk to school or ride the bus to school. Which sample method is biased?

a Survey 25 students chosen randomly on the bus

b Surveying 25 students chosen randomly in the library

c Surveying 25 students chosen randomly in the cafeteria

d Surveying 25 students chosen randomly at an assembly

Answer:

○ a) Survey 25 students chosen randomly on the bus
Reasoning: Bias should be avoided in statistical analysis and surveys. Participants should be selected randomly, but from a location not involved in your survey.

33. Which of the following describes independent events?

a Choose a set of earrings, put them on, then choose another set of earrings.

b Draw a marble from a bag. Do not replace it. Draw another marble.

c Pick a vegetable for a side dish, then pick a meat for a main course.

d Pick a name from a hat. Do not replace it. Pick another name.

Answer:

○ c) Pick a vegetable for a side dish, then pick a meat for a main course.

Reasoning: Independent events are events that do not depend on any other event. Solutions a, b, and d all alter the probability because the number of items to choose from is decreased when the first item picked is not returned to the set. However, option c, the number of vegetables is unlimited as is the type of meat. The meat and vegetables do not depend on each other or alter the number of choices.

Do you have a group of students who need a boost in math?

Each student could receive personalized lessons every week from our specialist one-on-one math tutors.

- Differentiated instruction for each student
- Aligned to your state's standards
- Scaffolded learning to close gaps

“We just had our first session and it went great! The kids really liked it and felt like they were learning! One even said he finally felt like math was making sense.”

Michelle Craig, Instructional Coach,
Sherwood Forest Elementary, Washington

Speak to us

thirdspacelearning.com/us/

(929) 298-4593

hello@thirdspacelearning.com

THIRD SPACE LEARNING