

Sixth grade math test solution

1.

In the equation below, what is the value of x

$$20 = x + (2 \times 8) - 6$$

First, calculate $(2 \times 8) - 6 = 16 - 6 = 10$

Rewrite the equation

$$20 = x + 10$$

Since $20 = 10 + 10$, $x = 10$

2.

Sarah has 30 pencils. Her friend Sylvia has k less pencils. Which expression shows the number of pencils Sylvia has?

A. $30 + k$ B. $k - 30$ C. $30 - k$ D. $30 - 2k$

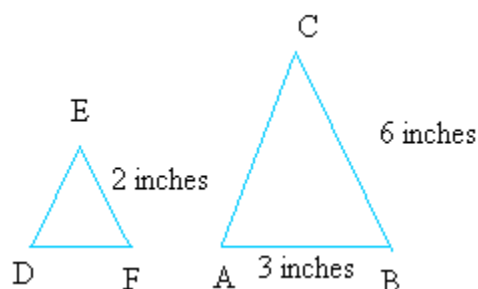
To understand this problem, first try to understand this easier version

Sylvia has 30 pencils and her friend has 2 less.

The friend has $30 - 2 = 28$ pencils

So if it is k less, you just need to do $30 - k$. The answer is C.

3. Triangle ABC is similar to triangle DEF



What is the length of DF?

A. 2 inches **B.** 1 inch **C.** 3 inches **D.** 1.5 inches

Let $x = DF$. Set up a proportion

$$\frac{2}{6} = \frac{x}{3}$$

Cross multiply

$$2 \times 3 = x \times 6$$

$$6 = x \times 6$$

$$\text{Since } 6 = 1 \times 6, \quad x = 1$$

$$DF = 1 \text{ inch}$$

4.

What is the value of the expression below?

$$5^3$$

A. 15 **B.** 8 **C.** 25 **D.** 125

$$5^3 = 5 \times 5 \times 5 = 25 \times 5 = 125$$

5. Use the following list to find the average or mean, the median, the mode, and the range

10, 15, 5, 8, 6, 6, 2

Average = _____

Median = _____

Mode = _____

range = _____

$$\text{Average} = \frac{(10+ 15+ 5+ 8+ 6+ 6+ 2)}{7}$$

$$\text{Average} = \frac{52}{7} = 7.42$$

Median is the value in the middle after the data is put in order

10, 15, 5, 8, 6, 6, 2

2 5 6 **6** 8 10 15

6 is in the middle, so the median is 6

The mode is the value that appear the most.

6 appears the most, so 6 is the mode.

The range is the highest value minus the lowest after the data is put in order

$$\text{Range} = 15 - 2 = 13$$

6.

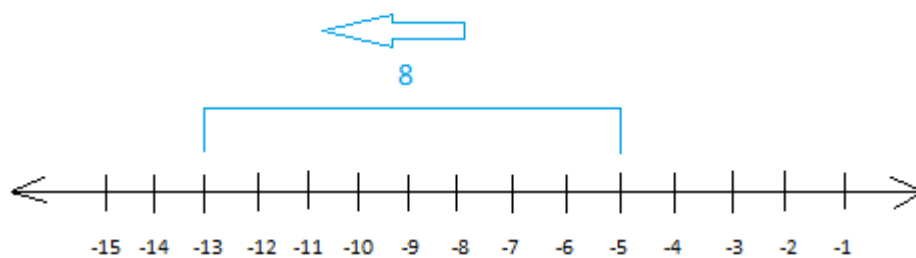
$$-5 - 8 = \underline{\hspace{2cm}}$$

$$5 - 8 = \underline{\hspace{2cm}}$$

$$-8 - 5 = \underline{\hspace{2cm}}$$

The technique we will use here is a number line

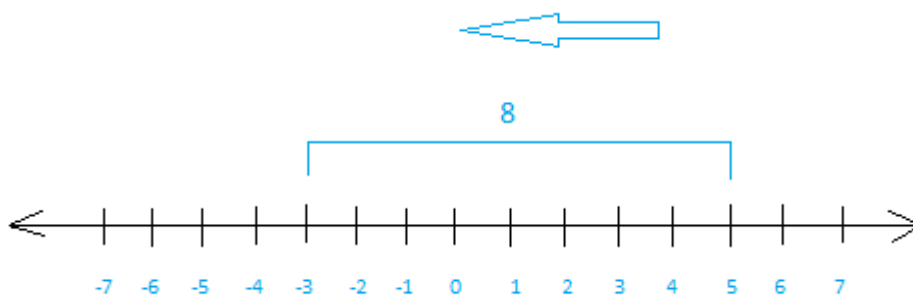
-5 – 8 means start at -5 and move 8 units to the left



$$-5 - 8 = -13$$

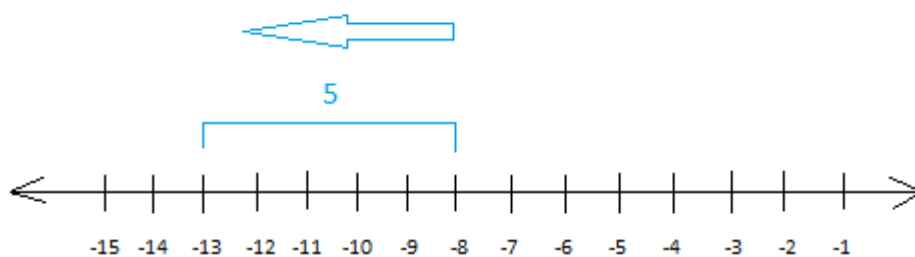
$$5 - 8$$

5 - 8 means start at 5 and move 8 units to the left



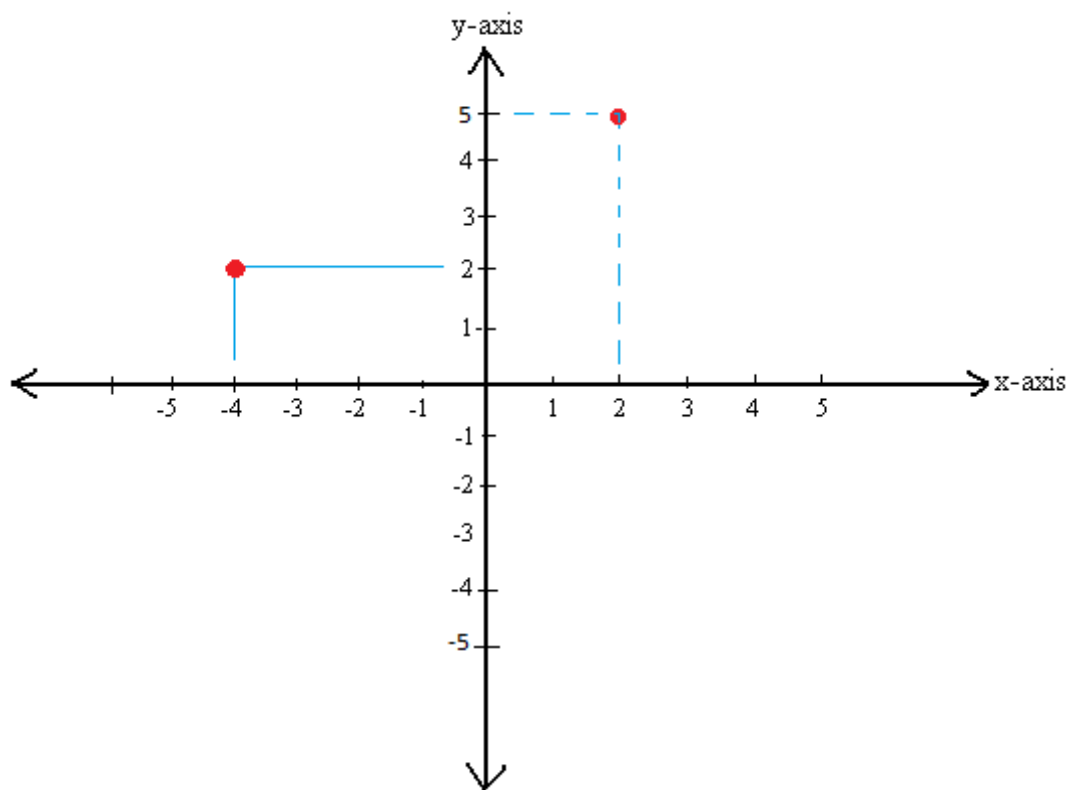
$$5 - 8 = -3$$

-8 - 5 means start at -8 and move 5 units to the left



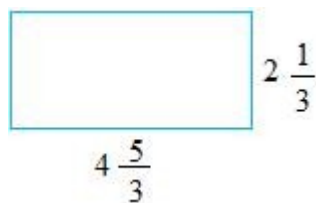
$$-8 - 5 = -13$$

7. Draw a coordinate system in the space below and then plot (2,5) and (-4, 2)



8.

Find the perimeter and area of the rectangle below:



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

First, add the whole numbers.

$$2 + 2 + 4 + 4 = 12$$

Then, add the fractions

$$\frac{1}{3} + \frac{1}{3} + \frac{5}{3} + \frac{5}{3} = \frac{(1+1+5+5)}{3} = \frac{12}{3} = 4$$

$$\text{perimeter} = 12 + 4 = 16 \text{ units}$$

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

$$\text{Area} = \frac{(2 \times 3 + 1)}{3} \times \frac{(4 \times 3 + 5)}{3}$$

$$\text{Area} = \frac{7}{3} \times \frac{17}{3} = \frac{(7 \times 17)}{(3 \times 3)} = \frac{119}{9}$$

9.

Get a die and throw it.

The different outcomes are _____

Write the probability of getting an even number _____

Write the probability of getting an odd number _____

Write the probability of getting a prime number _____

The different outcomes are 1 2 3 4 5 6

There are 3 even numbers (2, 4, and 6) and 6 outcomes

The probability of getting an even number is $\frac{3}{6}$

There are 3 odd numbers (1, 3, and 5) and 6 outcomes

The probability of getting an odd number is $\frac{3}{6}$

There are 3 prime numbers (2, 3, and 5) and 6 outcomes

The probability of getting a prime number is $\frac{3}{6}$

10. Add $\frac{3}{5}$ and $\frac{2}{7}$ _____

$$\frac{3}{5} + \frac{2}{7} = \frac{(3 \times 7)}{(5 \times 7)} + \frac{(2 \times 5)}{(7 \times 5)} = \frac{21}{35} + \frac{10}{35} = \frac{31}{35}$$

11.

For the number 76.2345, the value of the digit 4 is

A. 4 tens **B.** 4 tenths **C.** 4 thousandths **D.** 4 ten-thousandths

The value of the digit 4 is the thousandths

12.

If $9450 \div x$ equals 21, what is x ? _____

$$\frac{9450}{x} = 21$$

$$\frac{9450}{x} = \frac{21}{1}$$

Cross multiply

$$9450 \times 1 = x \times 21$$

$$9450 = 21x$$

Divide both by 21

$$\frac{9450}{21} = \frac{21x}{21}$$

$$450 = x$$

13.

Put the following numbers, in order from least to greatest

-1/4, 7/4, 0.90, -2/4, 0.20, 3/4, 1.50, -0.50,

_____, _____, _____, _____, _____, _____, _____, _____

We will put them from least to greatest.

First, let's put the positive numbers from least to greatest because it is easier

Keep in mind that the positive numbers will be greater than the negative numbers

Note that $\frac{3}{4} = 0.75$

Note also that $\frac{7}{4} = \frac{(4+3)}{4} = \frac{4}{4} + \frac{3}{4} = 1 + \frac{3}{4} = 1.75$

0.20, 0.75, 0.90, 1.50, 1.75

Let us now put in order the negative numbers. -1/4, -2/4, -0.50,

$$\frac{-2}{4} = -0.50$$

$$\frac{-1}{4} = -0.25$$

From least to greatest, we get

$-\frac{2}{4}$, -0.50 , $-\frac{1}{4}$, 0.20 , $\frac{3}{4}$, 0.90 , 1.50 , $\frac{7}{4}$

14.

a. You want to save money to buy a bike. You start with 50 dollars and you save 4 dollars each day. Which expression show the amount of money you have after x days?

$50 - 4x$

$4x - 50$

$4x + 50$

$50 + 4 \times 10$

b. How much money do you have after 20 days?

A. 120 dollars **B.** 130 dollars **C.** 110 dollars **D.** 200 dollars

The money that you save is going to be $50 +$ extra money saved

Extra money saved after 3 days

Day 1: 4

Day 2: $4 + 4$ or 2×4 (The 2 next to the 4 is the number of days)

Day 3: $4 + 4 + 4$ or 3×4 (The 3 next to the 4 is the number of days)

Therefore, just multiply the money you save each day by the number of days

For x days, it will then $x \times 4$

The total money saved is $50 + x \times 4$

After 20 days, you saved $50 + 20 \times 4 = 50 + 80 = 130$ dollars

15.

a. Write down all composite numbers bigger than 10 and smaller than 20 (Hint: there are 5 of them

_____, _____, _____, _____, _____,

Pick a composite number and write down all the factors in the space below

b. Write down all prime numbers bigger than 10 and smaller than 20 (Hint: there are 4 of them

_____, _____, _____, _____

A composite number is a number that can be divided by numbers other than 1 and the number itself

For example, 36 is a composite number because it can be divided by 6 besides 1 and 36

Composite numbers bigger than 10 and smaller than 20 are 12, 14, 15, 16, and 18

I pick 15. The factors of 15 are 1, 3, 5, and 15

A prime number is a number that can be divided only by 1 and the number itself.

For example, 7 is a prime number because it can only be divided by 1 and 7

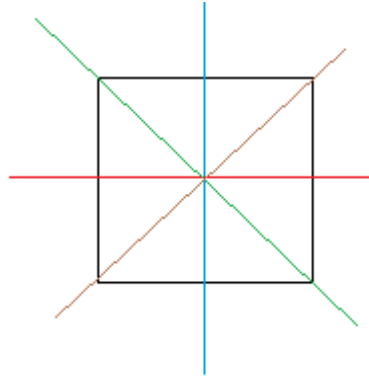
Prime numbers bigger than 10 and smaller than 20 are 11, 13, 17, and 19

16.

How many lines of symmetry does a square have? _____

Each line of symmetry is shown with a different color

A square has 4 lines of symmetry



17.

The diameter of a circle is 8 inches

The perimeter and area are :

- A.** $P = 4\pi$ and $A = 12\pi$ **B.** $P = 16\pi$ and $A = 8\pi$ **C.** $P = 8\pi$ and $A = 16\pi$
D. $P = 16\pi$ and $A = 4\pi$

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

$$\text{Perimeter} = 2 \times \pi \times r = 2 \times \pi \times 4 = 8\pi$$

$$\text{Area} = \pi \times r^2 = \pi \times 4^2 = \pi \times 4 \times 4 = \pi \times 16 = 16\pi$$

The answer is C.

18.

John and Peter have 40 dollars together. If John has 4 times more money than Peter. How much money does each have? (Hint: try trial and error)

John has _____ dollars

Peter has _____ dollars

Pretend peter has 2 dollars and John has 4 times more or 8 dollars. However, $2 + 8 = 10$ not 40

Pretend peter has 10 dollars and John has 4 times more or 40 dollars. However, $10 + 40 = 50$

(too big!)

Pretend peter has 9 dollars and John has 4 times more or 36 dollars. However, $9 + 36 = 45$
(too big!)

Pretend peter has 8 dollars and John has 4 times more or 32 dollars. Moreover $8 + 32 = 40$
(Found!)

Therefore, Peter has 8 dollars and John has $8 \times 4 = 32$ dollars

19.

A machine produces 5000 items in 6 minutes. Which proportion **cannot** be used to find how many minutes it takes to produce 15000 items?

A. $5000 / 6 = 15000 / x$ **B.** $5000 / 6 = x / 15000$ **C.** $6 / x = 5000 / 15000$ **D.** $6 / 5000 = x / 15000$

5000	-----	6 minutes
15000	-----	x minutes

You can have all the following proportions to solve this proportion problem

$$\frac{5000}{15000} = \frac{6}{x}$$

$$\frac{15000}{5000} = \frac{x}{6}$$

$$\frac{5000}{6} = \frac{15000}{x}$$

$$\frac{6}{5000} = \frac{x}{15000}$$

The one that you cannot use is B or $5000 / 6 = x / 15000$

20. You go to the restaurant and buy food for 120 dollars. The restaurant requires a 15% tip. What is your total?

$$\text{Tip} = 120 \times 15\%$$

$$= 120 \times \frac{15}{100} = \frac{120}{1} \times \frac{15}{100} = \frac{(120 \times 15)}{(100 \times 1)} = \frac{1800}{100} = 18$$

$$\text{Total} = 120 + 18 = 138 \text{ dollars}$$

21.

In a map, 1 inch represents 30 miles. How many inches will show a distance of 120 miles?

1 inch ----- 30 miles

x inches ----- 120 miles

You could use the following proportion

$$\frac{1}{x} = \frac{30}{120}$$

Cross multiply

$$1 \times 120 = x \times 30$$

$$120 = 30x$$

$$\text{Since } 120 = 30 \times 4, x = 4$$

1 inch ----- 30 miles

4 inches ----- 120 miles

22.

A box contains 6 blue marbles, 4 yellow marbles, and 10 red marbles.

What is the probability of choosing a red marble?

A. 4 / 20 **B.** 3 / 20 **C.** 6 / 20 **D.** 10 / 20

Which color is less likely to be picked? _____

There are 10 red marbles and 20 marbles

The probability of picking a red marble is $\frac{10}{20} = 0.50 = 50\%$

There are less yellow marbles than blue or red marbles, so a yellow marble is less likely to be picked

23.

a. Write down a brief definition of congruence

Figures that have the same shape and the same size

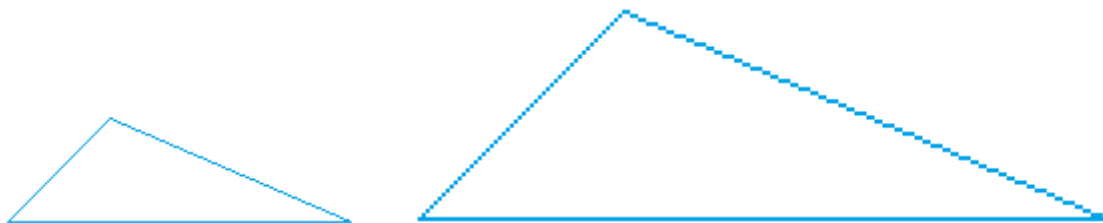
Make a drawing to show two shapes that are congruent



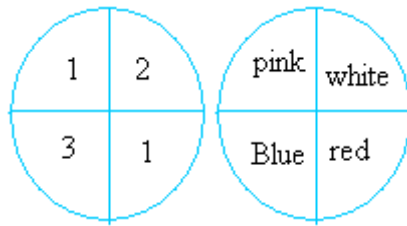
b. Write down a brief definition of similarity

Figures that have the same shape, but different size

Make a drawing to show two shapes that are similar



24. Spin each spinner once and list all possible outcomes (Hint: one outcome is 2 and white)



All the possible outcomes are (1, pink) ; (1,white) ; (1, blue) ; (1, red) ; (2, pink) ; (2,white) ; (2, blue) ; (2, red) ; (3, pink) ; (3,white) ; (3, blue) ; (3, red) ; (1, pink) ; (1,white) ; (1, blue) ; (1, red) ;

There are 16 outcomes

(1, red) shows up twice, so the probability of getting (1, red) = $\frac{2}{16}$

25.

Evaluate the numerical expression below:

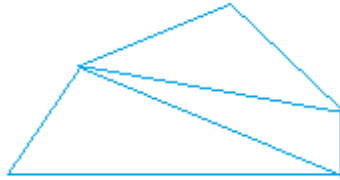
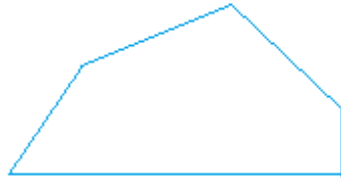
$$(8 + 2)[(7 - 3) \times 5]$$

A. 100 B. 150 C. 300 D. 200

$$\begin{aligned}(8 + 2)[(7 - 3) \times 5] &= 10 \times [(7 - 3) \times 5] \\ &= 10 \times [(4) \times 5] \\ &= 10 \times 20 \\ &= 200\end{aligned}$$

26.

What is the sum of the angle in a pentagon? (Hint: divide the pentagon into triangles. A triangle is 180 degrees)



Each triangle is 180 degrees.

Since there are 3 triangles in a pentagon, the sum of the angle equal $3 \times 180 \text{ degrees} = 540$

27

- a. How many inches are in 3 and $\frac{1}{2}$ feet?
- b. How many meters are in 500 centimeters?

1 foot = 12 inches

$\frac{1}{2}$ foot = $12/2 = 6$ inches

2 feet = 24 inches

3 feet = 36 inches

3 and $\frac{1}{2}$ feet = $36 + 6 = 42$ inches

1 meter = 100 centimeters

2 meters = 200 centimeters

3 meters = 300 centimeters

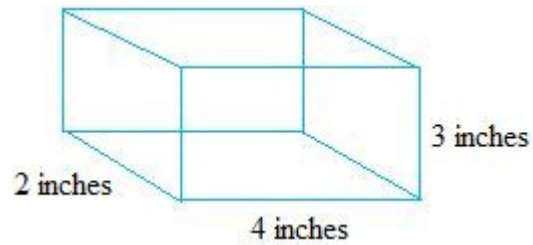
4 meters = 400 centimeters

5 meters = 500 centimeters

There are 5 meters in 500 centimeters

28.

What is the volume and surface area of the following rectangular prism?



Volume = _____

Surface area = _____

$$\text{Volume} = 2 \times 4 \times 3 = 8 \times 3 = 24$$

There are 2 sides with dimensions 4 and 3, so area = $2 \times (4 \times 3)$

There are 2 sides with dimensions 2 and 4, so area = $2 \times (2 \times 4)$

There are 2 sides with dimensions 3 and 2, so area = $2 \times (3 \times 2)$

$$\text{Surface area} = 2 \times (4 \times 3) + 2 \times (3 \times 2) + 2 \times (2 \times 4)$$

$$= 2 \times (12) + 2 \times (6) + 2 \times (8)$$

$$= 24 + 12 + 16$$

$$= 36 + 16$$

$$= 52$$

29.

a. The shape of a swimming pool is more like a

A. Rectangular prism **B.** Circle **C.** pyramid **D.** Sphere

b. Look up a soccer field online. Then, identify 4 geometric figures

_____, _____, _____, _____

The shape of a swimming pool is more like a rectangular prism.

You can see the following figures on a soccer field

Circles, rectangles, points, and segments

30.

You go shopping and you see a sign that says." Buy 1 T-shirt and get 20% off on the second T-shirt. The T-shirt cost 30 dollars and you buy 2 T-shirts. What is your total? _____

$$20\% \text{ of } 30 = \frac{20}{100} \times 30 = \frac{20}{100} \times \frac{30}{1} = \frac{600}{100} = 6$$

The price of the second T-shirt is $30 - 6 = 24$

You pay $30 + 24 = 54$ dollars