

# Final Exam Review Answers

## Unit 1: Integers

1.  $3 + (-5) = -2$

2.  $(-5) - (-3) = -2$

3.  $3 + (-5) - (-8) = +6$

4.  $4 + 3 \times 2 = 10$

(Remember that multiplication comes before addition in the order of operations)

5.  $(-5) - (-8) \div 4$   
 $= (-5) - (-2)$   
 $= (-3)$

6.  $\frac{3 + (6 - 3) \times (-2)}{4 - (15 \div (-3))}$   
 $= \frac{3 + 3 \times (-2)}{4 - (-5)}$   
 $= \frac{3 + (-6)}{9}$   
 $= \frac{-3}{9} = -\frac{1}{3}$

## Unit 2a: Ratios and Rates

7. Complete the following ratio:  $3 : 5 : 9 = 9 : x : y$

The second ratio is three times the first, so multiply all the first terms by 3:

$$3:5:9 = 9:15:27$$

$$x = 15$$

$$y = 27$$

8. Complete the following ratio: 12 is to 15 as 9 is to x.

$$\frac{12}{15} = \frac{9}{x}$$

There are many ways of finding x. One way is to know that to change a 12 into a 9 by multiplication and division you multiply by 3 and divide by 4. If you do the same to the 15 you get  $x = 11.25$

Another way to solve this is to divide 15 by 12 to figure out what you need to multiply 9 by to get x.  $15 \div 12 = 1.\bar{25}$ , so  $x = 1.\bar{25} \times 9$ , which is 11.25.

9. Eighteen oranges cost \$45.00. What is the **unit rate** for oranges?  
The unit rate is the price per one orange. You can get this by division:  
 $45 \div 18 = 2.5$  so the price is \$2.50 per orange.

10. A cookie recipe calls for 2 cups of flower and 3 cups of milk. If you only have 1.5 cups of flower, how much milk should you add?

$$\frac{2}{3} = \frac{1.5}{x}$$

Similar to question 8. I know that I can multiply  $2 \times 1.5$  to get 3, so if I multiply  $1.5 \times 1.5$  I can get "x".

$$1.5 \times 1.5 = 2.25$$

$$x = 2.25$$

You should add 2 and one quarter cups of milk.

11. A car drives 450 km in 3 hours. What is the speed (rate of movement) of the car?  
Speed is a unit rate – we want to know how far the car goes in one hour.

$$\frac{450}{3} = \frac{x}{1}. \text{ To get "x", just do } 450 \div 3 \text{ and you will get the unit rate of } 150 \text{ km/h.}$$

12. A blueprint for an airplane has a scale of 1:200. On paper, the airplane is 30 cm long. How long is the airplane in real life?

The scale means that everything is 200 times bigger in real life than in the blueprint. So if the blueprint is 30 cm long, then multiply this by 200 to get the real length of the plane.

$$30 \text{ cm} \times 200 = 6000 \text{ cm or } 60 \text{ m}$$

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## Unit 2b: Fractions

13.  $\frac{2}{3} + \frac{5}{3} = \frac{7}{3}$

14.  $1\frac{1}{2} - 4\frac{3}{5}$

Remember, to add and subtract mixed numbers, change them into pure fractions first. Then

to add or subtract them, you must find a common denominator – in other words, they must have the same number on the bottom of the fractions, otherwise you would be adding or subtracting different-sized pieces.

$$= \frac{3}{2} - \frac{23}{5} = \frac{15}{10} - \frac{46}{10} = \frac{-31}{10} = -3\frac{1}{10}$$

$$15. \frac{2}{3} \times 9 = \frac{2}{3} \times \frac{9}{1} = \frac{18}{3} = 6$$

$$16. 2\frac{1}{5} \div 1\frac{1}{2}$$

Earlier in the year we figured out that dividing by a fraction is the same as multiplying by its reciprocal:

$$\frac{12}{5} \div \frac{3}{2} = \frac{12}{5} \times \frac{2}{3} = \frac{24}{15} = \frac{8}{5} = 1\frac{3}{5}$$

17. If you roll a die and then flip a coin, what is the probability of getting a “4” followed by a “tails”?

The probability of independent events is the product of their individual probabilities.

The probability of rolling a “4” is one out of six, and the probability of getting tails is one out of two. So the probability of getting both is:

$$\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$$

### Unit 3: Percents

18. What is 45% of 90?

To find the percent “of” a number, multiply:  $\frac{45}{100} \times 90 = 0.45 \times 90 = 40.5$

19. What is 120% of 60?

$$\frac{120}{100} \times 60 = 1.2 \times 60 = 72$$

20. What percent is 30 out of 36?

$$\frac{30}{36} = \frac{x}{100}$$

Probably the easiest way to find “x” is to divide 30 by 36 to figure out what you need to multiply 100 by to get “x”:

$$30 \div 36 = 0.8\bar{3}$$

$$0.8\bar{3} \times 100 = x$$

$$x = 83.\bar{3}$$

So the percent is 83.3%.

21. What percent is 9 out of 6?

Same as in number 20:

$$\frac{9}{6} = \frac{x}{100}$$

$$9 \div 6 = 1.5$$

$$100 \times 1.5 = 150$$

$$x = 150$$

So the percent is 150%.

22. Twenty is 40% of what number?

In these questions where you don't know the total amount (you don't know 100%), you can divide to find what 1% is and then multiply by 100 to find out what 100% is:

$$\frac{20}{x} = \frac{40}{100}$$

$$20 \div 40 = 0.5$$

$$100 \times 0.5 = 50$$

$$x = 50$$

So 20 is 40% of 50.

In this question, the ratio can also be easily solved by knowing that the second is exactly double the first, but the numbers are not always so easy.

23. After going on sale at 20% off, a shirt costs \$24.00. What did it cost originally?

Same as question 22, but not as easy. The \$24 is 80% of the original price:

$$\frac{24}{x} = \frac{80}{100}$$

$$24 \div 80 = 0.3$$

$$100 \times 0.3 = 30$$

$$x = 30$$

So the original price is \$30.00.

24. The population of a town is 1300 people. If this increases by 4%, what is the new population?

We just need to find out what 4% of 1300 is and add it on:

$$4\% \times 1300 = 0.04 \times 1300 = 52. \text{ The population increase is 52 people. The new population is 1352.}$$

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#### Unit 4: Squares, Roots, and the Pythagorean Theorem

25. Write this number in scientific notation: 4 315 000

Remember, in scientific notation, the first number must have only one digit to the left of the decimal place. In this case, the number will be 4.315. The question is, to get 4 315 000, do we need to multiply by ten or divide by ten? Since it is getting larger, we multiply by ten six times:

$$4\,315\,000 = 4.315 \times 10^6$$

26. Write this number in normal (non-scientific) notation:  $3.51 \times 10^{-4}$

The number in the question is 3.51 divided by ten 4 times, so it will get smaller. The decimal must move to the left to make it smaller:

$$3.51 \times 10^{-4} = 0.000\ 351$$

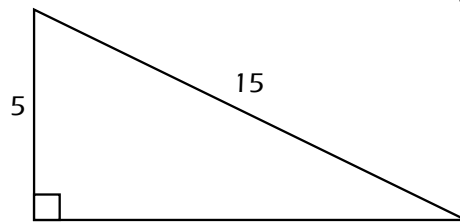
27. What is the square of 3.5?

The square of a number is the number multiplied by itself (as if it were the side length of a square):  $3.5 \times 3.5 = 12.25$

28. Estimate the square root of 55

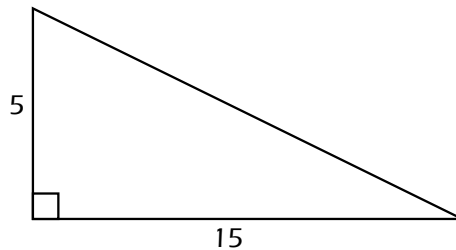
The square root of a number is the number that you have to square to get your original number. To estimate this, figure out what perfect squares 55 is close to. Because it is between 49 and 64, the square root must be between 7 and 8. I'll estimate 7.5.

29. Find the unknown side in this triangle:



Remember, the if you add up the squares of the two shorter sides it equals the square of the longest side (hypotenuse). In this case, we already know the hypotenuse, so we already know that the two smaller squares must add up to 225. Since the square of the left side is 25, the other square must be 200. This means that the length of the unknown side is the square root of 200, which is around 14.

Find the unknown side in this triangle:



This question is similar, except now we don't know the hypotenuse. Using equations instead of words this time:

$$h^2 = 5^2 + 15^2$$

$$h^2 = 250$$

$$h = \sqrt{250}$$

$$h \approx 15.8$$

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### Unit 5: Solving Equations

30. Solve:  $3x + 8 = 29$

Subtract 8 from both sides:  $3x = 21$

Divide both sides by 3:  $x = 7$

31. Solve:  $3x + 2 = 5x - 8$

Subtract  $3x$  from both sides:  $2 = 2x - 8$

Add 8 to both sides:  $10 = 2x$

Divide both sides by 2:  $5 = x$

32. Solve:  $2(3x - 5) = -22$

Divide both sides by 2:  $3x - 5 = -11$

Add 5 to both sides:  $3x = -6$

Divide both sides by 3:  $x = -2$

33. Solve:  $2(x - 3) + 2 = 5(x - 1)$

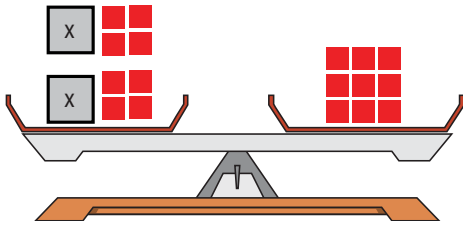
Expand each group:  $2x - 6 + 2 = 5x - 5$

Subtract  $2x$  from each side and add numbers together:  $-4 = 3x - 5$

Add 5 to both sides:  $1 = 3x$

Divide both sides by 3:  $\frac{1}{3} = x$

34. Write the equation represented by this diagram and solve:



$2(x + 4) = 9$  or  $2x + 8 = 9$

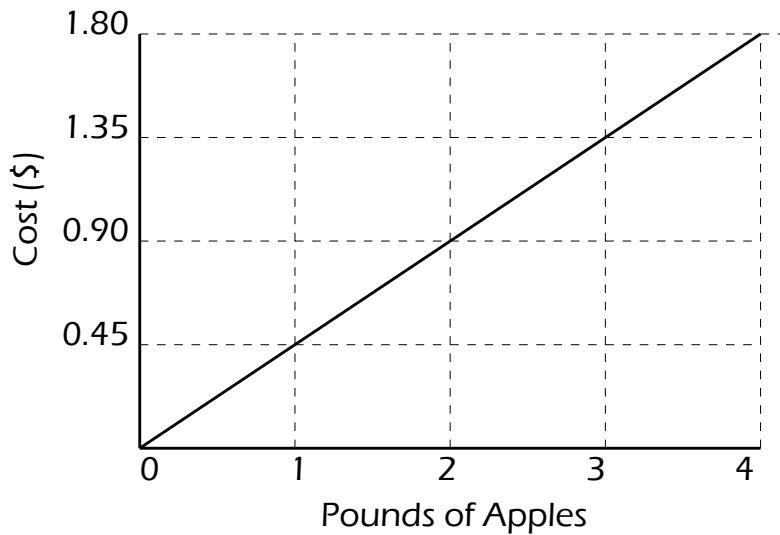
35. Draw a diagram to represent the equation  $2(x - 5) = 6$

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## Unit 6: Graphing and Linear Relations

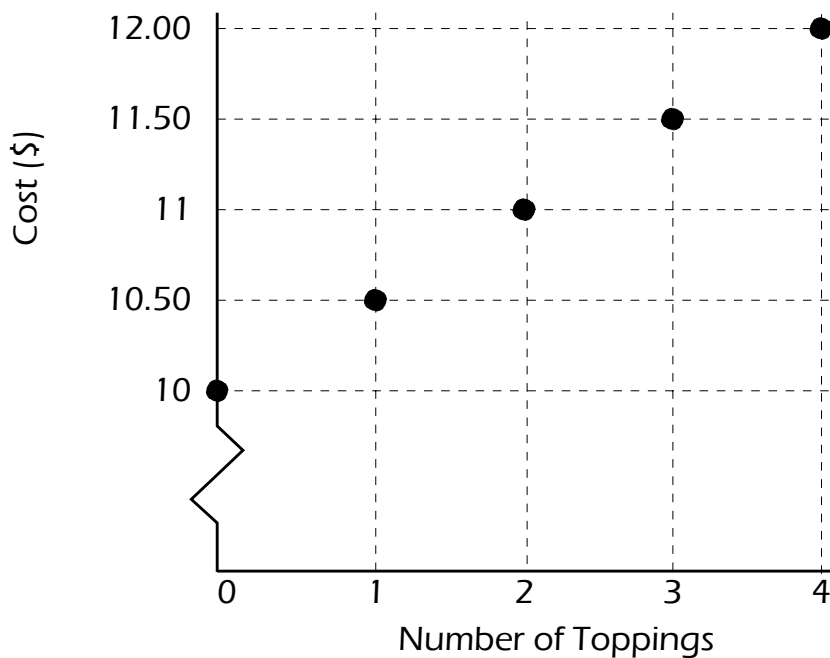
36. Apples cost \$0.45 per pound. Represent the cost of apples using a linear relation. Plot this relation on a coordinate plane.

Relation:  $C = 0.45p$  where "C" is the total cost and "p" is the number of pounds.



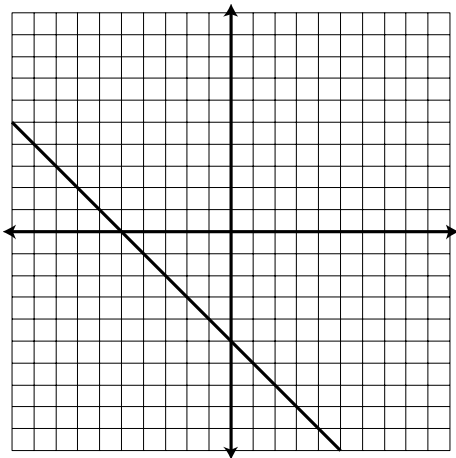
37. A pizza costs \$10 plus \$0.50 per topping. Represent the cost of a pizza as a linear relation based on the number of toppings you buy. Plot this relation on a coordinate plane.

Relation:  $C = 0.5t + 10$  where "C" is the total cost and "t" is the number of toppings.



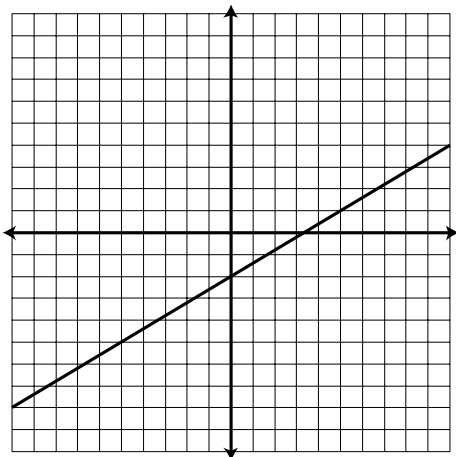
Note that you cannot make a line because you can't have part of a topping.

38. Plot the equation  $y = -x - 5$  on a coordinate plane by creating a table of values. Choose some x-values and find out what y becomes. For example, if  $x = 3$  then  $y = -8$ . This becomes the point  $(3, -8)$  which you can plot on the coordinate plane.



39. Plot the equation  $y = \frac{3}{5}x - 2$  on a coordinate plane **without** creating a table of values.

Without a table of values, use the fact that the rate of change is  $\frac{3}{5}$  and the starting point is  $-2$ . Just put your pencil at  $(0, -2)$  and go up three and right 5 (or down three and left 5) and connect the points with a line:



40. What is the linear relation given in this table of values:

x	y
-4	3
0	-1
2	-3
8	-9

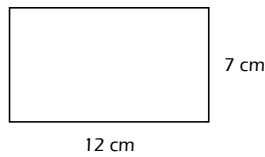
The rate of change is that for every 4 the x value increases, the y-value decreases by 4:  $\frac{-4}{4} = -1$ .

The starting point is  $(0, -1)$ , so the equation is:  $y = -1x - 1$ .

## Unit 7: Area and Perimeter

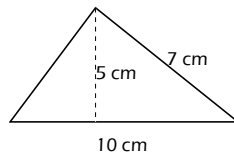
41. Find the area and perimeter of each of the following:

a)



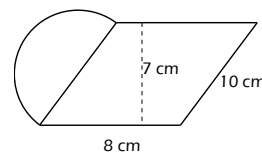
$$a) A = 12 \times 7 = 84 \text{ cm}^2$$

b)



$$b) A = \frac{1}{2} \times 10 \times 5 = 25 \text{ cm}^2$$

c)



$$c) A_{\text{parallelogram}} = 8 \times 7 = 56 \text{ cm}^2$$

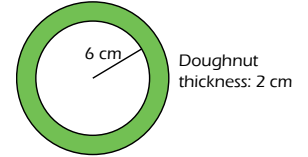
$$A_{\text{semicircle}} = \pi \times 5 \times 5 \div 2 = 39.3 \text{ cm}^2$$

$$A_{\text{TOTAL}} = 95.3 \text{ cm}^2$$

$$P = 12 + 12 + 7 + 7 = 38 \text{ cm}$$

There isn't enough information to get perimeter easily (although it is possible)

d)



$$d) A_{\text{large circle}} = \pi \times 8 \times 8 = 64\pi = 201.1 \text{ cm}^2$$

$$A_{\text{small circle}} = \pi \times 6 \times 6 = 36\pi = 113.1 \text{ cm}^2$$

$$A_{\text{TOTAL}} = 201.1 - 113.1 = 88 \text{ cm}^2$$

$$P = 8 + 10 + 8 + \text{semicircle}$$

$$P_{\text{semicircle}} = \pi \times 10 \div 2 = 15.7 \text{ cm}$$

$$P_{\text{TOTAL}} = 41.7 \text{ cm}$$

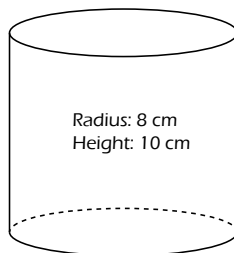
$$P = P_{\text{small circle}} + P_{\text{large circle}}$$

$$P = \pi \times 12 + \pi \times 16 = 88 \text{ cm}$$

## Unit 8: Surface Area, Volume, and Views of shapes

42. Find the surface area and volume of each of the following:

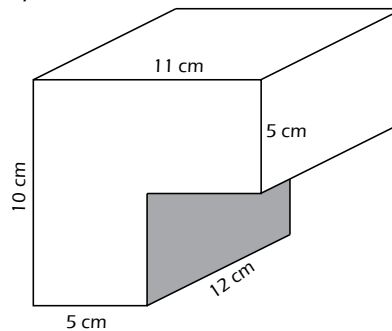
a)



$$a) V = \underbrace{\pi \times 8 \times 8}_{\text{area of circle}} \times 10$$

$$V = 2010 \text{ cm}^3$$

b)



$$SA = 2 \text{ circles} + \text{rectangle}$$

$$A_{\text{circles}} = \pi \times 8 \times 8 \times 2 = 402 \text{ cm}^2$$

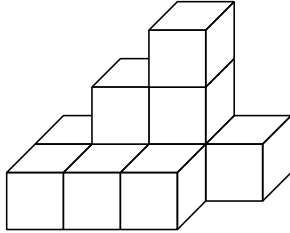
$$A_{\text{rectangle}} = \underbrace{\pi \times 16}_{\text{circumference}} \times 10 = 502 \text{ cm}^2$$

$$SA = 904 \text{ cm}^2$$

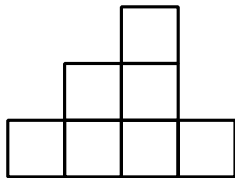
b) For this one, the volume is just the area of the "L"-shaped end multiplied by 12. The area of the "L" is  $105 \text{ cm}^2$ , so the volume is  $1260 \text{ cm}^3$

The surface area is just the total of all the rectangles you would get if you flattened it out. This is hard for me to draw, but the answer is  $714 \text{ cm}^2$

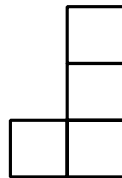
43. Draw the front, side, and top views of the following shape:



Front:



Side:



Top:

