

Applications in Support of Classroom Instruction (P)

These types of problems are unique to the ParaPro Assessment and deal directly with classroom instruction. In terms of instruction, it is not enough to know *how* to solve a problem, you must be able to see where students are making mistakes so you can offer corrective suggestions.

These problems will present you with a situation in which a student has made a mistake in a math problem. Your task is to identify his or her mistake and/or indicate what should be done instead.

Hint: Take your time on these problems. It really helps to work the actual problem out first. Then, you can compare your work to the student's work. This can often point out the trouble spot more quickly.

The following examples will illustrate this type of problem.

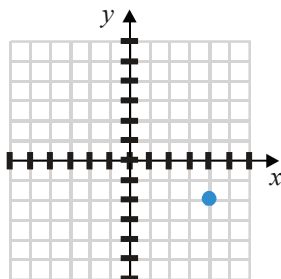
• **Examples**

1. Chad is asked to solve $2x + 3 = 5$ but doesn't understand why his answer is wrong. He shows you the following work:

$$\begin{aligned} 2x + 3 &= 5 \\ 2x &= 5 + 3 \\ 2x &= 8 \\ x &= 4 \end{aligned}$$

What, if anything, is wrong with his work?

2. Stephanie is asked to plot the ordered pair $(-2, 4)$. She plots the following:



What, if anything, is wrong with her plot?

3. Sherry is having trouble evaluating $2 \cdot 5 + 8 \cdot 2 + 2$. She shows you the following work:

$$\begin{aligned} 2 \cdot 5 + 8 \cdot 2 + 2 \\ 10 + 8 \cdot 2 + 2 \\ 18 \cdot 2 + 2 \\ 36 + 2 \\ 38 \end{aligned}$$

What, if anything, is wrong with her work?



4. David is asked to find the area of a rectangle that has a width of 6 centimeters and a length of 15 centimeters. He shows you the following:

$$A = 2L + 2W$$

$$A = 2(15) + 2(6)$$

$$A = 30 + 12 = 42 \text{ cm}^2$$

$$x = 4$$

What, if anything, is wrong with his work?

• **Solutions**

1. This problem requires you to know how to solve a linear equation. First, solve the equation; then determine where Chad went wrong.

$$2x + 3 = 5$$

$$2x + 3 - 3 = 5 - 3$$

$$2x = 2$$

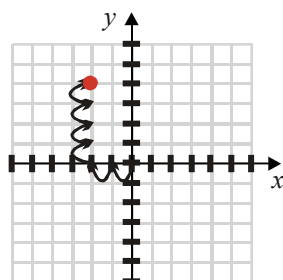
$$2x/2 = 2/2$$

$$x = 1$$

In Chad's work, he added three to the right side when he should have subtracted.

2. This problem requires you to know how to plot a point. First plot the point $(-2, 4)$, and then see if you can determine Stephanie's mistake.

To plot the point, start at the origin; move two units left (since the x-coordinate is -2); and then move four units up (since the y-coordinate is 4).



It appears that Stephanie switched the coordinates. She went to the right 4 units and down 2 units. The point she plotted has coordinates $(4, -2)$.

3. This problem requires you to know the order of operations. Start by simplifying the expression, and see whether you can determine Sherry's mistake.

$$\begin{array}{ll} 2 \cdot 5 + 8 \cdot 2 + 2 & \text{Do multiplication and division first from left to right.} \\ 10 + 16 + 2 & \text{Do addition and subtraction next from left to right.} \\ 26 + 2 & \\ 28 & \end{array}$$

In the third line of Sherry's work, she did not follow the order of operations. She added before she finished multiplying.

4. This problem requires you to know how to find the area of a rectangle. The formula is $A = L \cdot W$. The expression that David is using, $2L + 2W$, is the perimeter of the rectangle and does not have square units.

A Look Ahead

You are just about finished reviewing the material necessary to succeed on either the WorkKeys or ParaPro Assessment. The remainder of this part involves sample test questions and a short review quiz. Part 8 of the module presents a short tutorial on using a calculator. Only the basic operations will be presented since you will not be required to do any advanced computations.

Sample Test Questions

These questions are examples of what might appear on the ParaPro Assessment. The WorkKeys math portion consists entirely of word problems, but you will need the skills covered in this section to help you solve those problems.

Applications Related to Classroom Setting

1. In Marsha's fifth-grade class, homework counts as 30% of a student's grade, and exams count as 70% of the grade. If a student in her class has a 90% for his homework grade and an 80% for his exam grade, what is his course grade? Round to the nearest whole percent.
 - a. 85%
 - b. 83%
 - c. 68%
 - d. 50%
2. The average amount of money spent in a cafeteria is \$4.25, and the average cost of the food made for the customer is \$1.20. The cost to operate the cafeteria per week is roughly \$1,500 per week plus the cost of the ingredients used. Estimate the number of customers needed per week (on average) for the cafeteria to break even.
 - a. 350
 - b. 1,200
 - c. 275
 - d. 500



3. During a 5-day used-book charity drive, Matt's sixth-grade class collected the following:

Day	Hardbound	Paperback
Monday	2	8
Tuesday	3	7
Wednesday	5	14
Thursday	0	7
Friday	1	6
Total	11	42

How many total books did his class collect *after* Wednesday?

- a. 11
b. 14
c. 19
d. 67
4. To get ready for the upcoming class party, Pam needs to determine how much money each child needs to bring in to cover the cost of the pizza (only the students will be eating pizza). Each pizza costs \$7 and has 8 slices. She has 30 students in her class and wants to have enough pizza so that each student can have 2 slices. How much should each student bring in (to 2 decimal places)?
- a. \$0.88
b. \$1.75
c. \$1.87
d. \$2.37
5. The school day at Fox Lake Elementary begins at 8:25 AM and lasts for 7 hours. What time is it when half of the school day is complete?
- a. 11:45 AM
b. 11:55 AM
c. 12:15 PM
d. 12:25 PM

Solutions

1. The question asks for the student's grade. Let's call this value x . Now try writing a word equation.

$$\text{final grade} = .3 (\text{hw grade}) + .7 (\text{exam grade})$$

Plug in what you know:

$$x = .3 (.9) + .7 (.8)$$

Solve the equation:

$$x = .27 + .56 = .83$$

The student's grade would be 83%. (Answer b.)

2. Start by letting x be the average number of customers needed per week. Since the average person spends \$4.25 and the cost of individual meals (to the cafeteria) is \$1.20, the cafeteria makes $\$4.25 - \$1.20 = \$3.05$ per person that can be applied to costs other than food. Since this is about \$3 per person, and the costs are \$1,500, we can estimate the number of customers needed by solving the following equation:

$$x = \frac{1500}{3} = 500$$

The cafeteria should serve about 500 customers per week to break even.
(Answer d.)

3. "After Wednesday" means on Thursday or Friday. We simply need to add up the individual amounts for hardbound and paperback on those days.

$$0 + 7 + 1 + 6 = 14$$

Matt's class collected a total of 14 books after Wednesday. (Answer b.)

4. Consider the following word equation:

$$\text{cost per student} = \frac{\text{total cost of pizza}}{\text{number of students}}$$

We know the number of students, but we don't know the total cost of the pizza. Each pizza costs \$7 so we could say, . . .

$$\text{total cost of pizza} = 7 (\text{number of pizzas})$$

Now we know a little more, but we don't know how many pizzas we need. Each pizza has 8 slices so we could say,

$$\text{total cost of pizza} = \frac{\text{total slices}}{8}$$

Another problem . . . we don't know how many slices we need. We do know that each of the 30 students should get 2 slices. Since $30 \cdot 2 = 60$, we need a total of 60 slices. We can use this to find the number of pizzas required:

$$\text{number of pizzas} = \frac{60}{8} = 7.5$$

Since we can't order just half a pizza, we need to get 8 pizzas.

We have the number of pizzas, so we can get the total cost:

$$\text{total cost of pizza} = 7 (8) = \$56$$

The total cost will be \$56.

With the total cost, we can find the cost per student:

$$\text{cost per student} = \frac{56}{30} \approx 1.87$$

Each student needs to bring in \$1.87 to cover the cost of the pizza. (Answer c.)

5. Since the school day is 7 hours long, half the day is 3.5 hours. The day starts at 8:25. Three hours later will be 11:25. Half an hour is 30 minutes, so an additional 30 minutes makes the time 11:55. Half the day is complete at 11:55 AM. (Answer b.)

**Applications Related to Classroom Instruction**

1. Patrick is having trouble with simplification and shows you the following:

$$\begin{aligned} &2(x + 9) + 5x - 3 \\ &2x + 9 + 5x - 3 \\ &7x + 6 \end{aligned}$$

What, if anything, is wrong with his work?

- Patrick did not collect like terms correctly.
 - Patrick did not distribute correctly.
 - Patrick did not finish combining terms.
 - Nothing is wrong. The problem is worked correctly.
2. Ashley is supposed to illustrate the commutative property of addition using the expression $4 + (9 + 3)$. She incorrectly writes $(4 + 3) + 9$.

Which of the following statements would Ashley need to use?

- $(9 + 3) + 4$
 - $(4 + 9) + 3$
 - $4 + 9 + 3$
 - $4 + 12$
3. Sydney was asked to evaluate $(3^2)(3^5)$ and write the answer in exponential form. She wrote the following incorrect statement: $(3^2)(3^5) = 3^{10}$

Which of the following statements should Sydney have written instead?

- $(3^2)(3^5) = 9^{10}$
 - $(3^2)(3^5) = 9^7$
 - $(3^2)(3^5) = 6^{10}$
 - $(3^2)(3^5) = 3^7$
4. Peter was given the number 823.74961 and was asked to identify the number in the hundredths place. He *incorrectly* reasons that 7 is in the oneths place and 4 is in the tenths place, so 9 must be in the hundredths place. What is the correct number?
- 8 is the correct number since it represents 800.
 - 4 is the correct number since there is no oneths place.
 - 5 is the correct number since the thousandths place is larger than 4.
 - There is nothing wrong with his reasoning. 9 is the correct number.
5. Jeff is trying to find the area of an equilateral triangle whose sides are all 10 centimeters long. He is having trouble and shows you the following work:

$$A = \frac{1}{2}bh = \frac{1}{2}(10\text{ cm})(10\text{ cm}) = 50\text{ cm}^2$$

What, if anything, is wrong with Jeff's work?

- He should be using the formula $A = l \cdot w$ to find the area.
- The height of an equilateral triangle is not one of its sides.
- The area should not have square units.
- Nothing is wrong with his work. The answer is correct.

Solutions

1. Start by simplifying the expression:

$$\begin{aligned} 2(x + 9) + 5x - 3 \\ 2x + 18 + 5x - 3 \\ 7x + 15 \end{aligned}$$

In the second line of work, Patrick did not correctly distribute the 2. (Answer b.)

2. The commutative property says that the order of addition is not important. This is illustrated by saying that $4 + (9 + 3) = (9 + 3) + 4$. Ashley has also changed the grouping of the addition (which relates to the associative property), but she was not asked to do so. The correct answer is a.

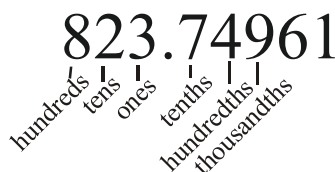
Note: the commutative property could also have been illustrated by saying $4 + (9 + 3) = 4 + (3 + 9)$, but this was not one of the answers.

3. Start by simplifying the expression using rules of exponents.

$$(3^2)(3^5) = 3^{2+5} = 3^7$$

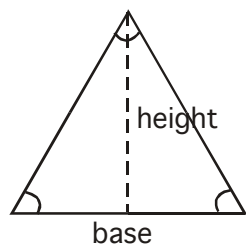
Sydney incorrectly multiplied the exponents when she should have added them. The correct answer is d.

4. The first place after the decimal place is the tenths place.



There is no oneths place, so answer b. is correct.

5. Jeff is using the correct formula for finding the area of a triangle; however, he is not using the correct values. For an equilateral triangle, we would have . . .



The base of an equilateral triangle is the length of one of the sides, but the height is not. The height is only one of the sides if we have a right triangle. The correct answer is b.