LESSON 1: THE EFFECTS OF WIND

EXERCISES

- Review your Unit Assessment from the previous unit.

- Write your wonderings about algebraic reasoning.

- Write a goal stating what you plan to accomplish in this unit.

- Based on your previous work, write three things you will do differently during this unit to increase your success.

LESSON 2: EXPRESSIONS AND EQUATIONS   EXERCISES

EXERCISES

1. Jack is 6 years older than Karen. Let h be Jack's age and c be Karen's age. Which equation correctly represents this situation?

   A $h = 6c$

   B $c = 6h$

   C $c + 6 = h$

   D $h + 6 = c$

2. People often need to convert between centimeters and inches. One inch (i) is equal to 2.54 cm (c). Which equations correctly show this conversion? There may be more than one correct answer. Put a check mark next to each equation that is correct.

   A $i = 2.54c$

   B $c = 2.54i$

   C $i = \dfrac{c}{2.54}$

   D $c = \dfrac{i}{2.54}$

   E $ic = 2.54$

3. To convert a temperature from degrees Celsius to degrees Fahrenheit, the rule of thumb is to multiply by $\dfrac{9}{5}$, and then add 32. Which equation correctly shows this conversion? (F represents degrees Fahrenheit, and C represents degrees Celsius.)

   A $F = (C \cdot 32) + \dfrac{9}{5}$

   B $F = (C \cdot \dfrac{9}{5}) - 32$

   C $C = (F \cdot 32) + \dfrac{9}{5}$

   D $F = (C \cdot \dfrac{9}{5}) + 32$

LESSON 2: EXPRESSIONS AND EQUATIONS

EXERCISES

4. To determine your score in a card game, you need to take the number of cards you have, multiply that by 4, and then subtract 7. Let *s* represent the score, and *c* represent the number of cards. Which equation correctly represents this situation?

   A $s = 4c - 7$

   B $s = 4c + 7$

   C $s = 7c - 4$

   D $s = 7c + 4$

5. Marcus is 4 in. taller than Jack. Answer these problems about Marcus and Jack.

   a. Let b = Jack's height in inches. Write an algebraic expression for Marcus's height in inches.

   b. Use the expression to find Marcus's height if Jack is 61 in. tall.

6. Jack is 5 cm shorter than Sophie.

   a. Let s = Sophie's height in centimeters. Write an algebraic expression for Jack's height in centimeters.

   b. Jack is 115 cm tall. Write and solve an equation to find Sophie's height.

7. This rule of thumb estimates how much blood is in a person's body, based on that person's weight:

   The amount of blood (in liters) is equal to the weight (in kilograms) divided by 13.

   a. Write this rule of thumb as an algebraic equation. Use b for the amount of blood (in liters) and w for the weight (in kilograms).

   b. Use your equation to estimate the weight of a person who has 5 L of blood.

   ### Challenge Problem

8. A rule of thumb for serving cheese at a party is to serve $\frac{1}{2}$ oz for each guest.

   Let g = the number of guests at the party, and let c = the number of ounces of cheese you should serve.

   a. Write this rule of thumb as an algebraic equation.

   b. How much cheese should you buy if you are having 15 guests?
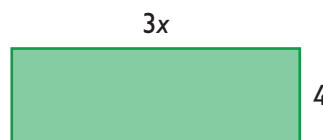
LESSON 3: EXPRESSIONS IN GEOMETRY

EXERCISES

EXERCISES

1. Determine which expressions are equivalent to $2x + 6$. There may be more than one correct answer. Put a check mark next to each expression that is correct.
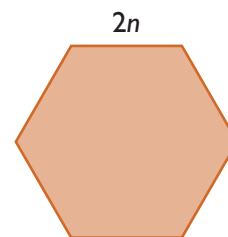
   Ⓐ $x + x + 6$

   Ⓑ $x + 12$

   Ⓒ $2(x + 3)$

   Ⓓ $2(x + 6)$

   Ⓔ $x + 8$

2. A rectangle has the dimensions shown here. Which expression correctly represents the area of this rectangle?

   Ⓐ $3x + 4$

   Ⓑ $6x + 8$

   Ⓒ $12x$

   Ⓓ $7x$

3. Each side of this regular hexagon has a length of $2n$. Which expression correctly represents the perimeter of this hexagon?

   Ⓐ $6n$

   Ⓑ $12n$

   Ⓒ $64n$

   Ⓓ $2n$

4. A equilateral triangle has a perimeter of $12d$. What is the side length of this triangle?

   Ⓐ $3d$

   Ⓑ $4d$

   Ⓒ $6d$

   Ⓓ $36d$

LESSON 3: EXPRESSIONS IN GEOMETRY   EXERCISES

5. Consider an equilateral triangle that has a side length equal to 3n. Write an expression that represents the perimeter of this triangle. Explain how you know your expression is correct.

6. Consider a rectangle made up of square tiles. Each tile has a side length of x.

   a. Create a rectangle that uses exactly 50 tiles. (There are a few different ways to do this.) Make a quick sketch of your rectangle, and include labels for the side lengths.

   b. Create an expression that represents the perimeter of your rectangle.

   c. Explain how you know your expression is correct.

7. Look at this figure.

   a. Create an expression that represents the perimeter of this figure.

   b. Create an expression that represents the area of this figure.
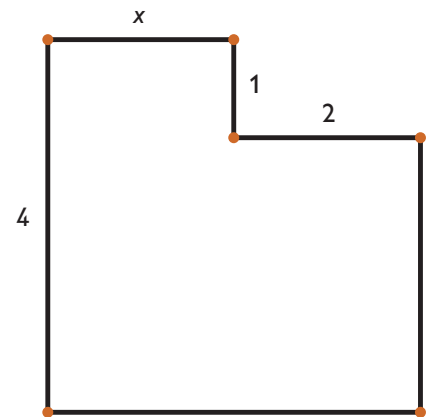
Challenge Problem

8. The perimeter, in inches, of a rectangle is 10x + 20. If the length of the rectangle is 5x in., what is its width?

9

LESSON 4: SIMPLIFYING EXPRESSIONS

EXERCISES

EXERCISES

1. Simplify each expression.

   a. $4x + 3x + 5 + 9$

   b. $3(2m + 5)$

   c. $4(2n) - 6(n - 5)$

2. Which expression is equivalent to $6(d + 4) + 3$?

   Ⓐ $6d + 7$

   Ⓑ $6d + 27$

   Ⓒ $6d + 24$

   Ⓓ $6d + 12$

3. Which expressions are equivalent to $6h + 2 + 3h + 7$? There may be more than one correct answer. Put a check mark next to each expression that is a correct answer.

   Ⓐ $9h + 9$

   Ⓑ $9(h + 1)$

   Ⓒ $8h + 10$

   Ⓓ $3(3h + 3)$

   Ⓔ $18h + 14$

4. Create an expression that represents the area of this figure and then simplify your expression.
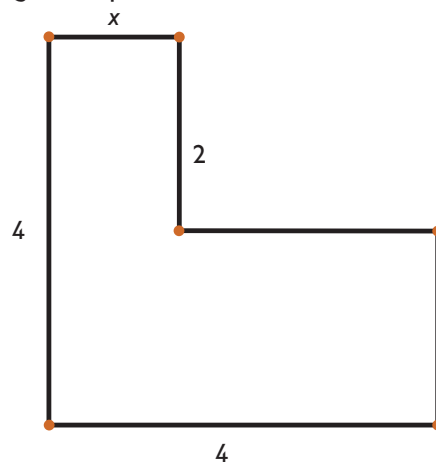
LESSON 4: SIMPLIFYING EXPRESSIONS

EXERCISES

5. A triangle has a base length of $4x + 6$ and a height of 3. Create an expression that represents the area of this triangle, and then simplify your expression.

    (A formula for the area of a triangle is $A = \frac{1}{2} bh$.)

6. Lucy showed how to simplify the expression $3(4x + 7) - (8x + 4)$.

    > Lucy
    >
    > $3(4x + 7) - (8x + 4)$
    > $12x + 10 - 8x + 4$
    > $4x + 14$

    Do you agree with Lucy? If not, explain and correct any mistakes you found in her work.

7. A rectangle has a length of 5 in. and a width of $(3x + 1)$ in. Create an expression that represents the area, and then simplify your expression.

Challenge Problem
....

8. Marcus says that $4x + 3$ and $2x + 3$ are equivalent expressions because when $x = 0$, each expression has a value of 3. Do you agree with Marcus? Explain why or why not.

# LESSON 5: SOLVE PERCENT PROBLEMS   EXERCISES

EXERCISES

1. Write this expression in simplest form.

    $a + 0.5a$

2. A blanket has an original price of x dollars. It is on sale for 20% off. Which expressions represent the sale price? There may be more than one correct answer. Put a check mark next to each expression that is a correct answer.

    Ⓐ $x + 0.2x$

    Ⓑ $0.8x$

    Ⓒ $1 - 0.2x$

    Ⓓ $\dfrac{4}{5}x$

    Ⓔ $x - 0.2x$

3. Write an expression in simplest form for each situation.

    a. The price in dollars for a table after 5% sales tax is added. The price before tax is d dollars.

    b. The sales price for a refrigerator that is on sale for 25% off. The original price is r dollars.

4. At the local game shop, you can trade in games and get 40% of their selling price. The game you want to trade in currently sells for $60. You could also sell this game online yourself and get $30 for it, but the website takes 5% of the money you make.

    If you want to make the most money, should you sell the game to the game shop or sell the game online yourself? Justify your response, and show the expressions you used to represent the situation.

5. The sales tax on an item in some parts of California is equal to 8.25% of the cost of the item. Jack says that an easy way to quickly estimate the sales tax is to move the decimal to the left one place.

    a. For a T-shirt that costs $14.50, Jack says the tax would be about $1.45. How accurate is his method?

    b. What would the total cost of the T-shirt be using Jack's method?

    c. What would the actual total cost of the T-shirt be at the register?

    d. Will Jack's approximation still work with high cost items? What is the difference between his estimate and the real cost for a TV that costs $1,000?

LESSON 5: SOLVE PERCENT PROBLEMS

EXERCISES

6. Karen is buying some cans of sardines that cost *s* dollars. The store is having a sale, where if you buy two cans of sardines, the second can is 75% off. Karen decides to buy two cans. Write an expression that represents the entire cost that Karen pays.

7. Look at this rectangle.
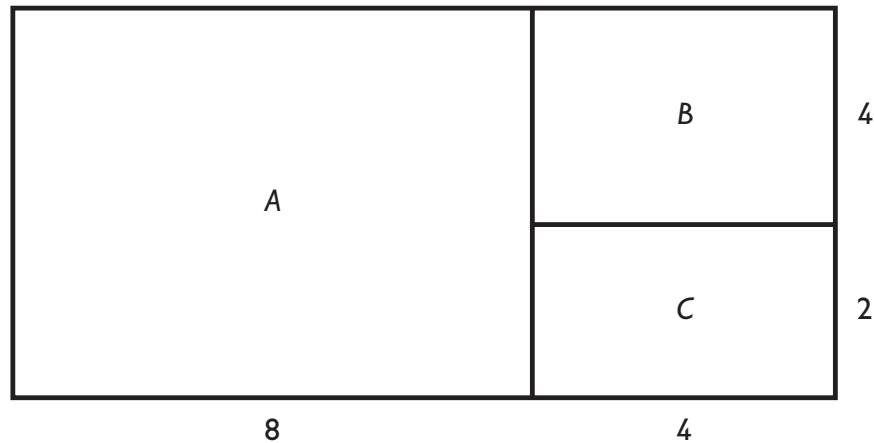
a. Calculate the percent of the total area that is contained in rectangle *A*. Show the steps you take to determine this.

b. Let *a* = the area covered by rectangle *A*. Create an expression that represents the remaining area (*B* + *C*) in terms of *a*.

Challenge Problem

8. Karen buys a coat that is on sale for 25% off the original price. She pays $75 for the coat. Karen says that the original price was $1.25 • $75, or $93.75. Do you agree or disagree? Explain.

PEARSON

LESSON 6: PROPERTIES OF EQUALITY

EXERCISES

EXERCISES

1. For each equation, determine if you need to use the addition property of equality or the multiplication property of equality to solve it.

   a. $5x = 45$
   - ☐ Addition property of equality
   - ☐ Multiplication property of equality

   b. $x + 5 = 45$
   - ☐ Addition property of equality
   - ☐ Multiplication property of equality

   c. $\frac{1}{5}x = 45$
   - ☐ Addition property of equality
   - ☐ Multiplication property of equality

For problems 2–4, solve each equation by using the addition property of equality and the multiplication property of equality. Show each step of your work, and note when you use each property. Then use substitution to check each solution.

2. $4x - 6 = 30$

3. $7 - 2x = 19$

4. $\frac{1}{3}x + 5 = 19$

5. Maya is 14 years old. She determined that she is 2 years older than 3 times the age of her little brother Amir. How old is Amir?

6. In a new card game "Danger-Hearts," you get a score at the end of the game based on which cards you have. You get 3 points for each heart card, and 13 points for the queen of spades.

   Marcus got 25 points. He had some heart cards and the queen of spades. How many heart cards did Marcus have?

7. Sophie and her 3 friends went bowling. It cost $6 for the lane and then a certain amount for each shoe rental. The total cost was $20 for all 4 friends to go bowling. How much was the cost of each shoe rental?

LESSON 6: PROPERTIES OF EQUALITY

EXERCISES

Challenge Problem
. . . .

8. Solve this equation. Show each step of your work.

$2(x - 8) = -20$

PEARSON

LESSON 7: STEPS TO SOLVING EQUATIONS

EXERCISES

EXERCISES

1. I think of a number, double it, and add 4. My answer is **16**. What number am I thinking of? Which equation represents this situation?

   A $2n + 4 = 16$

   B $2(n + 4) = 16$

2. Which is the correct solution for the equation $3(n - 7) = 12$?

   A $n = \dfrac{5}{3}$

   B $n = -3$

   C $n = 11$

   D $n = 33$

For problems 3 and 4, solve each equation and justify each step of your solution.

3. $2n + 4 = 16$

4. $2(n + 4) = 16$

5. Mr. Banks is 40 years old. In 5 years, he will be 3 times as old as his daughter Lucy.

   Create an equation that models this situation, and then solve the equation to determine how old Lucy is now.

6. A new movie rental plan at Netblix involves paying a monthly fee of $6, plus $1 for each movie rental. A competing plan at Redblocks has no monthly fee but charges $3 for each movie rental.

   a. Create an equation modeling how much each rental plan will cost in one month. Use the variable *m* to represent how many movies you rent that month.

   b. Which plan should you use? Justify your decision based on your equations, and explain what this decision depends on.

7. Marcus gets an allowance of $10 a week. He is saving to buy a new video game console that costs $400. He currently has $140. For how many weeks does he need to save to buy the game console?

PEARSON

LESSON 7: STEPS TO SOLVING EQUATIONS

EXERCISES

Challenge Problem

8. Solve this equation.

$$-2\left(x - 4\frac{1}{2}\right) = 10.4$$

PEARSON

LESSON 8: WRITING EQUATIONS

EXERCISES

EXERCISES

1. Choose the better estimate for 2($19.96) + $5.87.

   A a little less than $46

   B a little more than $46

2. Baseball tickets cost different amounts depending on how close the seats are to the field. Seats in the bleachers cost $12, but seats near the field cost $60. For a company outing, the group buys 2 of the expensive tickets and then bleacher seat tickets for the rest of the group. If the total cost was $252, how many bleacher seat tickets did they buy?

   A 21 bleacher seat tickets

   B 120 bleacher seat tickets

   C 31 bleacher seat tickets

   D 11 bleacher seat tickets

3. Sophie buys 3 boxes of granola, 2 cups of yogurt, and 1 bag of coffee at the grocery store. The total price was $19.57. If the granola, yogurt, and coffee had different prices, which equation correctly represents this situation?

   A $3g + 2y + c = 19.57$

   B $3x + 2x + x = 19.57$

   C $6g = 19.57$

   D $3g + 5g + 2c = 19.57$

For problems 4–6, write an equation, estimate the solution, decide if your estimate makes sense, and then solve the equation.

4. Karen buys 3 loaves of bread for $1.98 each and 4 packages of cheese. The total is $17.90. What is the cost of each package of cheese?

5. Mrs. Martin buys 5 tickets to the museum. She buys 3 adult tickets, which cost $8.75 each. The other 2 tickets are children's tickets. If the total cost of the tickets is $35.25, what is the price of a child's ticket?

6. Marcus bought a new portable game system and 3 games at the game shop. The total cost was $231.46. The system costs $139.99. If each of the 3 games cost the same amount, what was the price of each game?

LESSON 8: WRITING EQUATIONS

EXERCISES

7. Jack walks 5 dogs for his neighbor. He gets paid a $4 flat rate and then $3 per dog he walks. How much does he get paid altogether?

Challenge Problem

8. Write a word problem for this equation. Solve the equation, and write the answer to the word problem.

6($7.50) + 5$x$ = $100

PEARSON

LESSON 9: PUTTING IT TOGETHER 1   EXERCISES

- Read through your Self Check and think about your work in this lesson.

- Write down what you have learned during the lesson.

- What would you do differently if you were starting Self Check task now?

- Which method would you prefer to use if you were doing the task again? Why?

- Compare the new approaches you learned about with your original method.

- Record your ideas— keep track of problem-solving strategies.

- Complete any exercises from this unit you have not finished.

LESSON 13: PROPERTIES OF INEQUALITY   EXERCISES

EXERCISES

1. Write the inequality represented by the graph. Use x as the variable.

   $$\overset{\longleftarrow \quad \quad \quad \quad \quad \quad \quad \quad \circ}{\underset{-5 \;\; -4 \;\; -3 \;\; -2 \;\; -1 \;\;\; 0 \;\;\; 1 \;\;\; 2 \;\;\; 3 \;\;\; 4 \;\;\; 5}{\vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert \;\; \vert}}$$

For problems 2 and 3, select the correct solution to the inequality.

2. $4x + 6 > 26$

   (A) $x < 8$

   (B) $x > 8$

   (C) $x < 5$

   (D) $x > 5$

3. $-3x - 6 \leq 36$

   (A) $x \geq -14$

   (B) $x \geq 14$

   (C) $x \leq -14$

   (D) $x \leq 14$

For problems 4–7, solve each inequality and then show the solution on a number line.

4. $x + 8 < 14$

5. $-2x \geq 16$

6. $4x + \dfrac{1}{2} \leq \dfrac{1}{2}$

7. $-2x - 10 \leq 15$

Challenge Problem

8. Solve the inequality and show the solution on a number line.

   $2x + 7 \leq 5x + 2$

21   PEARSON

LESSON 14: SALES PER WEEK   EXERCISES

EXERCISES

1. Let x = Jack's age in years. Jack is at least 5 years old. Write an inequality representing Jack's age.

2. Sophie is x in. tall, and her shoes add 2 in. to her height. The roller coaster sign requires that riders be at least 45 in. tall. How tall does Sophie need to be to ride the roller coaster? Which inequality represents this situation?

    Ⓐ $x - 2 \geq 45$

    Ⓑ $x + 2 \geq 45$

    Ⓒ $x - 2 \leq 45$

    Ⓓ $x + 2 < 45$

3. In the game Jorgen's Quest, you get 10 points for each gold piece you find and 30 points for each enemy you defeat. You need to get at least 100 points in a round to win. Let g represent the number of gold pieces, and e represent the number of enemies. Which inequality represents this situation?

    Ⓐ $10 + 30 \geq 100$

    Ⓑ $g + e \geq 100$

    Ⓒ $10g + 30e \geq 100$

    Ⓓ $10g + 30e > 100$

4. Maya needs to wear over 30 buttons on her uniform while working at a family restaurant. Let b represent the number of buttons. Which inequality represents this situation?

    Ⓐ $b > 30$

    Ⓑ $b \geq 30$

    Ⓒ $b < 30$

    Ⓓ $b \leq 30$

LESSON 14: SALES PER WEEK

EXERCISES

For problems 5–7, write an inequality to represent the situation and solve it. Then write a sentence that describes the solution to the problem.

5. A pair of running shoes costs $15 and a pair of socks costs $2.50. Marcus bought a pair of running shoes and some socks. He spent less than $22.50. How many pairs of socks could he have bought?

6. Karen earns $350 per week plus $15 for every hour of overtime she works. How many hours of overtime must she work in order to earn more than $410 in one week?

7. Jack earns $470 a week. Lucy earns $320 plus $50 for each sale she makes. How many sales does Lucy need to earn more than Jack?

Challenge Problem

8. Karen used the inequality $16 < x < 17$ to represent her age in years. Write a sentence to describe how old Karen is.

LESSON 15: REAL ESTATE AND TRIANGLES

EXERCISES

EXERCISES

1. Solve this inequality. $100 - 2x \leq 60$

2. "In any triangle, the sum of the lengths of two of the sides must be greater than the length of the third side." If a triangle has the side lengths 4 and 7, which inequality represents the possible length x of the third side?

   A $x \leq 11$

   B $x \geq 11$

   C $x < 11$

   D $x > 11$

3. Mr. Washington is selling his house. He has to pay 8% of the selling price to the real estate agent for her services. Mr. Washington wants to make at least $500,000 on the sale after he pays the agent. Let p represent the selling price. Which inequality describes this situation?

   A $500,000 \leq 0.08p$

   B $500,000 \leq p - 0.08p$

   C $500,000 \geq 1 - 0.08p$

   D $500,000 \geq p$

For problems 4–7, write and solve an inequality for each situation. Then write the answer in a complete sentence.

4. Lucy went to buy 3 new aquariums from a man on Greg's List. All 3 aquariums were the same price. She handed the man $500, and the change she got back was less than $20. What did the price of each aquarium have to be greater than?

5. Marcus is selling frozen bananas. He started with 450 bananas. After the first 2 days, he had fewer than 350 bananas left. If he sold the same amount of bananas on both days, what is the least number of bananas he sold each day?

6. Sending a package using Fast Send costs $4.50 plus $0.25 per ounce. How many ounces can you send for under $7.00?

7. Sending a package using Fast Send costs $4.50 plus $0.25 per ounce. Sending a package with Quickship costs $5.50 plus $0.15 per ounce. Which service should you use? What does this decision depend on? Write and solve inequalities to justify your decision.

LESSON 15: REAL ESTATE AND TRIANGLES

EXERCISES

Challenge Problem

8. Solve this inequality. Show each step of your work.

$6x + 6 < -3(x + 7)$

 PEARSON

LESSON 16: INTERPRETING SOLUTIONS   EXERCISES

EXERCISES

1. If $2x < 13$, what is the greatest whole number value that works for x?

For problems 2–4, answer parts a–d for each math situation. Write "none" if there are no possible values that meet the description.

2. The product of 3 and some number n is less than or equal to 14.
    a. What is the greatest possible value of n?
    b. What is the least possible value of n?
    c. What is the least possible whole number value of n?
    d. What is the greatest possible whole number value of n?

3. The sum of x and 4 is less than $12\frac{1}{2}$.
    a. What is the greatest possible value of x?
    b. What is the least possible value of x?
    c. What is the least possible whole number value of x?
    d. What is the greatest possible whole number value of x?

4. The product of –2 and some number m is less than or equal to 8.
    a. What is the greatest possible value of m?
    b. What is the least possible value of m?
    c. What is the least possible integer value of m?
    d. What is the greatest possible integer value of m?

5. Jack is buying clothing for school. He has $50 to spend on clothes. He wants to buy a new jacket that costs $35 and then some T-shirts that each cost $20. Write an inequality showing how many T-shirts he can buy. Then write the answer in a complete sentence.

Karen is buying USB flash drives for her work. She can only spend up to $80. Each flash drive costs $19.50, and the shipping will be $7. How many flash drives can she buy? Write and solve an inequality describing the situation, and then write the answer in a complete sentence.

LESSON 16: INTERPRETING SOLUTIONS   EXERCISES

6. The gas tank in Mrs. Washington's car holds 14 gal of gasoline. She just filled the tank, but it has a hole in it. It leaks at a rate of 0.5 gal per hour. She is waiting at the rest stop just after she fills the tank. After some time, she checks the tank again, and it now has less than 10 gal left. How long has it been leaking?

Challenge Problem

7. The product of 3 and n is less than the product of 5 and n.
    a. What is the least possible whole number value for n?
    b. What is the greatest possible whole number value for n?
    c. What is the least possible integer value for n?
    d. What is the greatest possible integer value for n?

LESSON 17: PUTTING IT TOGETHER 2   EXERCISES

- Read through your Self Check and think about your work in this lesson.

- Write down what you have learned during the lesson.

- What would you do differently if you were starting Self Check task now?

- Which method would you prefer to use if you were doing the task again? Why?

- Compare the new approaches you learned about with your original method.

- Record your ideas— keep track of problem-solving strategies.

- Complete any exercises from this unit you have not finished.