Midterm Review: Knowledge Practice Questions

1.   Simplify using **exponent laws.** (State solutions as <u>positive powers</u>)

a) $\dfrac{\left(8x^5y\right)^2}{4x^5y^4}$

c) $(6a^4b^9)^3(2ab)(a^5)$

b) $\dfrac{\left(5x^5yz\right)\left(4x^4y^3\right)}{(10y^5z)^2}$

d) $(24a^3b^6)(9ab)(5a^3b^7) \div (a^0)$

2. Expand.

a) $-9(z^2 + 4z - 8)$

b) $6x(x^2 + 2x - 8y + 2)$

3. Simplify.

a) $3x^2 + 8 + x - 5x^2 + 6 - 10x$

b) $8a^2 - 2b + 8ab + 4 + 9ab - 3 + 6a^2$

4. Expand and simplify.

a) $8x(2 - 5x) - (-4x^2 + 10x)$

b) $8x + 5(4x - 14) - 5$

c) $x(-2x^2 - 9y) + 5xy - 2x(9x - 12y) - 8$

c) $5a(4 + 3b) - 7b(3 - 6a) + 12b$

5. Solve.

a) $\dfrac{x}{-8} = -5$

b) $7q - 3 = 18$

c) $-9x = 18$

d) $10w - 3 = -12$

e) $-10 + 5d = -2$

f) $5m + 9 = 12m - 3$

g) $\dfrac{9x+1}{-2} = 16$

h) $9(-3 - k) + 4 = 22 + k$

i) $2h - \dfrac{10h}{3} = \dfrac{2h-9}{6}$

j) $\dfrac{9y+1}{3} = \dfrac{2(4y-5)}{5}$

6.   Evaluate when a = −1 **and** b = 5

$8a^4b^3 - a^3b + 4ab^2$

7. Rearrange the following equations:

a) $A = \pi r^2$ (isolate r)   b) $y = \dfrac{rh}{x}$ (isolate x)

8. Translate the following expressions.

a)   The sum of a number and five

b)   Six more than quadruple a number

c)   Twelve less than a number

d)   Ten less than the difference between two and a number

9. Write each word equation as an algebraic equation.

a)   Four less than two times a number is fourteen.

b)   Twice a number increased by 10 is 40.

c)   A number tripled is five more than the number.

d)   Two times a number increased by five is ten.

e)   Four less than three times a number is twenty-three.

Midterm Review: Thinking/Inquiry and Application Practice Questions

10. Amanda is half of Selena's age. Alessia is three years older than Amanda. Together, the 3 girls are 45. Using an algebraic equation, find the ages of all 3 girls.

11. Chantal works at a music store. She earns $8 per hour plus $0.05 for each CD she sells. Tonight she is working a 5-h shift. How many CDs must Chantal sell to earn $42?

12. The sum of four consecutive odd integers is 48. Using an algebraic equation, find the 4 integers. (**Remember:** Define your variables and include a final statement)

13. Felix in playing a game. He begins with 300 points. For each round he wins, he gets 25 points. For each round he loses, 40 points are taken away.

   a) Express the total point for Felix using an algebraic expression.

   b) Use the expression from part a) to find the total points for Felix if he won 10 rounds and lost 4 rounds.

   c) Use the expression from part a) to find the total points for Felix if he won 3 rounds and lost 22 rounds.

14. Find a simplified expression for the area of this triangle.

$h = 3x^5y^3$

$b = 5x^4y^2z$
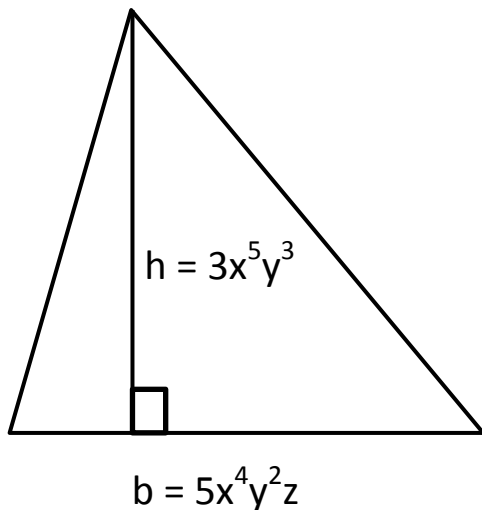
15. Sarah is choosing tiles for her backyard patio. The two tiles she has decided on are pictured below (all sizes in cm):

A   x

B   x

(4x + 2)

(3x + 7)
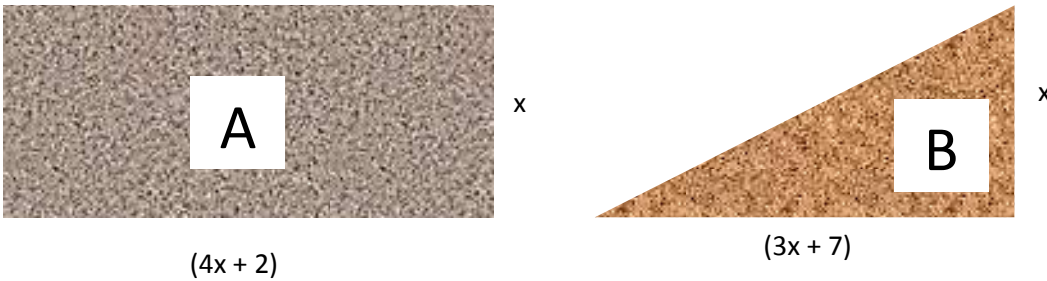
a) Determine a simplified expression for the area of each tile (A and B).

b) Determine a simplified expression for the TOTAL area of tiles needed if Sarah chooses 16 of tile A and 8 of tile B (Hint: Use your simplified expression from part a).

c) Sarah settles on the final dimensions of the times, and decides that **x = 5** for each tile. Use your answer from part b) to determine the total area of tile needed.

16. Katie works as an electrician. She earns $24.75 per hour, plus $54.00 for each house call she makes.

a) Create an expression to represent how much Katie earns.

b) Last week Katie worked 42 h and makes 4 house calls. How much did she earn?

c) Over Christmas break, Katie is scheduled to make 5 house calls. She hopes to earn $1062. How many hours does she need to work?

17. A rectangle has side lengths of (2x+5)cm and (5x-9) cm. Determine the simplified expression for the **perimeter** of the rectangle.

18. Determine the simplified expression for the **area** of a rectangle with sides (4x – 5) cm long and 9x cm wide.

19. Marco works at a sporting arena selling souvenirs. He makes $2 for every jersey he sells, $0.50 for every hat, and $0.25 for every key chain.

a) Write an expression to represent his total earnings.

b) Using your expression, determine how much he makes if he sells 10 hats, 3 jerseys, and 12 key chains.

20.   Use the diagram below to answer questions **a** and **b**.

6x – 5

x

4x + 1

3x – 9

3x
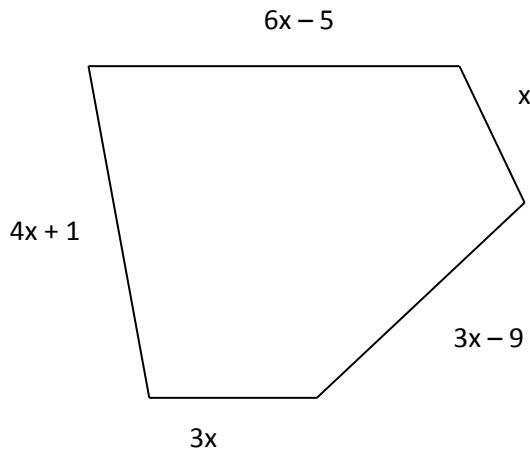
a) Express the perimeter of the figure as a simplified polynomial.

b) If the perimeter is 395cm, what is the value of x?

c) If x = 12, what is the perimeter?

21.   Amy and Kay have a furniture making shop. Amy makes the frame for the chairs and charges $160 for each one plus $13/h for her labour. Kay upholsters the chairs, and charges $75 for each upholstery plus $15/h for her labour.

a) Represent Amy's bill as a polynomial

b) Represent Kim's bill as a polynomial

c) Write a new polynomial that represents their total charges to make a chair. Assume that they both work the same amount of hours on the chair.

d) Calculate the cost for a chair if they both work 5 hours on it.

22. Cam is four times as old as Rex. Five years from now, the sum of their ages will be 30.

a) Create an equation that represents the relationship between Cam's and Rex's ages five years from now.

b) Use your equation to determine their current ages.

23.   A garden is in the shape of a right triangle. The base of the triangle is 12 m and the garden covers an area of 30 m^2. What is the height of the garden?

24. Together, Blackie and Jessie have a mass of 72 kg. Blackie's mass is 4 kg less than Jessie's mass. What is each dog's mass?

25. Use the diagram below to answer questions **a** to **c**.

$12x - 8$

$17x + 1$

H

G

$6x + 3$

$5x - 9$
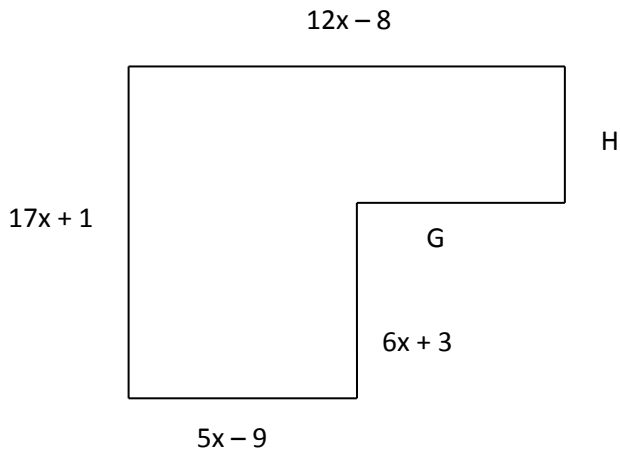
a) Find the expressions for the length of the two missing sides, G and H.

b) Express the perimeter of the figure as a simplified polynomial.

c) If the perimeter is 275cm, what is the value of x?

26. The length of a rectangle is 3 cm more than twice its width, *w*.

a) Find a **simplified** algebraic expression for the **perimeter** of a rectangle.

b) If perimeter is 30 m, find the **length** and **width** of the rectangle.

c) Find an algebraic expression for the **area** of the rectangle.

d) Find the area when *w* = 3.

27. A hot-air balloon is at a height of 600m. It develops a steady leak and begins to descend at a rate of 75m/min. Write and solve an equation to determine how long it takes for the balloon to reach a height of 25m.

28. Determine the simplified expression for the area of a circle with a radius of $2a^4b^2$

29. For the following shape:

8x + 5
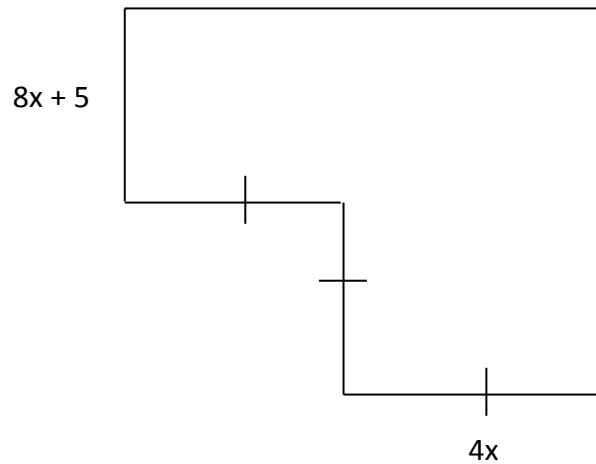
a) State the simplified algebraic expression for the <u>perimeter</u>.

b) Find the perimeter when $x = 3$

30. Without actually computing the values, explain how you know that this expression is equal to 0: $(-2^3)^2 - (-2^2)^3$

31. In order for $(x^2)(x^3)$ to have a value of 243, what would x have to be? **Explain** how you arrived at your answer.

32. St. Thomas of Villanova's student council hosted a 'Summer Beach Party'. Tickets were on sale for $5 in advance and $7.50 at the door. The student council raised $1200.

Let **a** represent the number of tickets sold in advance.

Let **d** represent the number of tickets sold at the door.

Let **T** represent the total money raised.

a) State an algebraic equation, which models this scenario.

b) Find the number of tickets sold at the door if they sold 90 tickets in advance.

<u>Midterm Review: Communication Practice Questions</u>

33. Two students solved the following problem, but they each got a different result. Both are sure they're correct.

Question: Solve the following: $6x + 2 = 18 - 3x$

<u>*Student 1 Solution*</u>

$6x + 2 = 20 - 3x$

$6x + 3x + 2 = 20 - 3x + 3x$

$9x + 2 - 2 = 20 - 2$

$9x = 18$

$\dfrac{9x}{9} = \dfrac{18}{9}$

$x = 2$

<u>*Student 2 Solution*</u>

$6x + 2 = 20 - 3x$

$3x + 2 - 2 = 20 + 2 - 3x$

$3x = 19$

$3x = 19$

$\dfrac{3x}{3} = \dfrac{19}{3}$

$x = \dfrac{19}{3}$

a) Who is correct?
b) What mistakes did the incorrect student make?
c) Prove who is correct by doing a LS=RS check for each student.

34. Susie and Josie both simplified the following math problem: $10 - 5(x - 3)$.

Susie answer was 5x + 15 and Josie's answer was −5x + 25.

a) What is the correct answer? (show all steps)
b) Who made the error and explain what she did incorrectly.

35. Explain the difference between like terms and unlike terms. Provide an example of a pair of like terms, and an example of a pair of unlike terms.

36. Explain why -5^6 and $(-5)^6$ are different.

37. Chis simplified the following expression. He made 3 errors. Identify all 3 errors and correctly simplify the problem.

$$\frac{(4x^2y^5)^2}{(3xy)(2xy^3)}$$

$$\frac{8x^4y^{25}}{6xy^4}$$

$$\frac{4}{3}x^3y^{21}$$

38. John simplified the following expression:

$$x^2 + 3x + x^2 + 2x$$

$$= x^4 + 6x^2$$

a) Describe the error that John made.
b) How can you convince John that these two expressions are not equal?
c) Simplify the expression properly.

39. Evaluate for p = 6 once before you expand the expression, and once after you expand.

$$3p^2(5 - p)$$

a) Explain how you know that you should get the same result both before you expand and after you expand it.
b) Was it easier to evaluate after you expanded it? Why?

40. Identify and explain the error and make the necessary corrections.

$$\frac{n^8}{n^2} = n^4$$

41. What is the difference between and equation and an expression?