

# Midterm Review: Knowledge Practice Questions

1. Simplify using **exponent laws**. (State solutions as positive powers)

$$a) \frac{(8x^5y)^2}{4x^5y^4} = 16x^5y$$

$$c) (6a^4b^9)^3(2ab)(a^5) = 432a^{18}b^{28}$$

$$b) \frac{(5x^5yz)(4x^4y^3)}{(10y^5z)^2} = \frac{0.2x^9}{y^6z}$$

$$d) (24a^3b^6)(9ab)(5a^3b^7) \div (a^0) = 1080a^7b^{14}$$

2. Expand.

$$a) -9(z^2 + 4z - 8) \\ = -9z^2 - 36z + 72$$

$$b) 6x(x^2 + 2x - 8y + 2) \\ = 6x^3 + 12x^2 - 48xy + 12x$$

3. Simplify.

$$a) 3x^2 + 8 + x - 5x^2 + 6 - 10x \\ = -2x^2 - 9x + 14$$

$$b) 8a^2 - 2b + 8ab + 4 + 9ab - 3 + 6a^2 \\ = 14a^2 + 17ab - 2b + 1$$

4. Expand and simplify.

$$a) 8x(2 - 5x) - (-4x^2 + 10x) = -36x^2 + 6x$$

$$b) 8x + 5(4x - 14) - 5 = 28x - 75$$

$$c) x(-2x^2 - 9y) + 5xy - 2x(9x - 12y) - 8 \\ = -2x^3 - 18x^2 + 20xy - 8$$

$$c) 5a(4 + 3b) - 7b(3 - 6a) + 12b \\ = 20a + 57ab - 9b$$

5. Solve.

$$a) \frac{x}{-8} = -5 \quad x = 40$$

$$b) 7q - 3 = 18 \quad q = 3$$

$$c) -9x = 18 \quad x = -2$$

$$d) 10w - 3 = -12 \quad w = \frac{-9}{10}$$

$$e) -10 + 5d = -2 \quad d = \frac{8}{5}$$

$$f) 5m + 9 = 12m - 3 \quad m = \frac{12}{7}$$

$$g) \frac{9x+1}{-2} = 16 \quad x = \frac{-11}{3}$$

$$h) 9(-3 - k) + 4 = 22 + k \quad k = \frac{-9}{2}$$

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

$$j) \frac{9y+1}{3} = \frac{2(4y-5)}{5} \quad y = \frac{-35}{21}$$

6. Evaluate when  $a = -1$  and  $b = 5$

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

$$= 905$$

7. Rearrange the following equations:

a)  $A = \pi r^2$  (isolate  $r$ )

$$r = \sqrt{\frac{A}{\pi}}$$

b)  $y = \frac{rh}{x}$  (isolate  $x$ )

$$x = \frac{rh}{y}$$

8. Translate the following expressions.

a) The sum of a number and five  $n + 5$

b) Six more than quadruple a number  $4n + 6$

c) Twelve less than a number  $n - 12$

d) Ten less than the difference between two and a number  $(2 - n) - 10$

9. Write each word equation as an algebraic equation.

a) Four less than two times a number is fourteen.  $2n - 4 = 14$

b) Twice a number increased by 10 is 40.  $2n + 10 = 40$

c) A number tripled is five more than the number.  $3n = n + 5$

d) Two times a number increased by five is ten.  $2n + 5 = 10$

e) Four less than three times a number is twenty-three.  $3n - 4 = 23$

## 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.

$$\text{Amanda} = 10.5 \quad \text{Selena} = 21 \quad \text{Alessia} = 13.5$$

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?

40 CDs

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)

9, 11, 13, 15

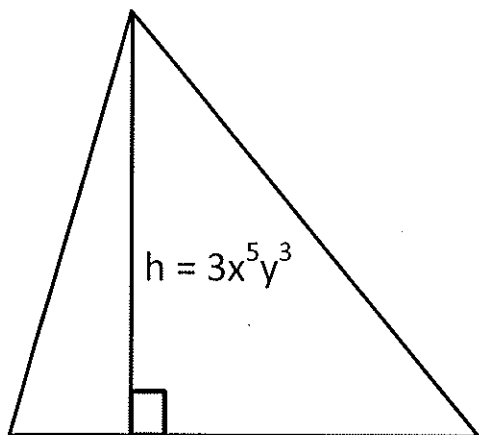
13. Felix is playing a game. He begins with 300 points. For each round he wins, he gets 25 points. For each round he loses, 40 points are taken away.

a) Express the total point for Felix using an algebraic expression.  $300 + 25w - 40n$

b) Use the expression from part a) to find the total points for Felix if he won 10 rounds and lost 4 rounds. 390

c) Use the expression from part a) to find the total points for Felix if he won 3 rounds and lost 22 rounds. -505

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



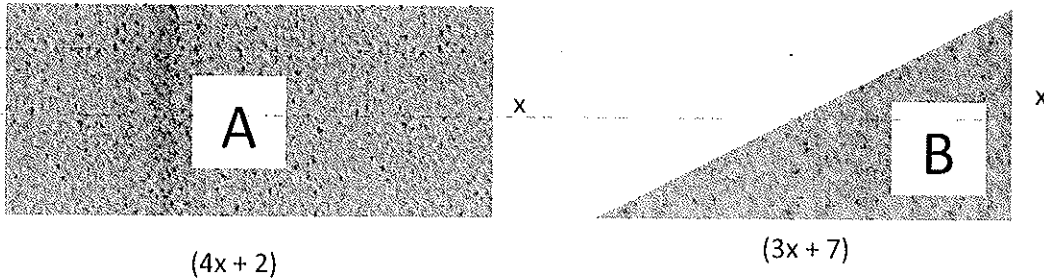
$$A = \frac{bh}{2}$$

$$A = \frac{5x^4y^2z(3x^5y^3)}{2}$$

$$A = \frac{15x^9y^5z}{2}$$

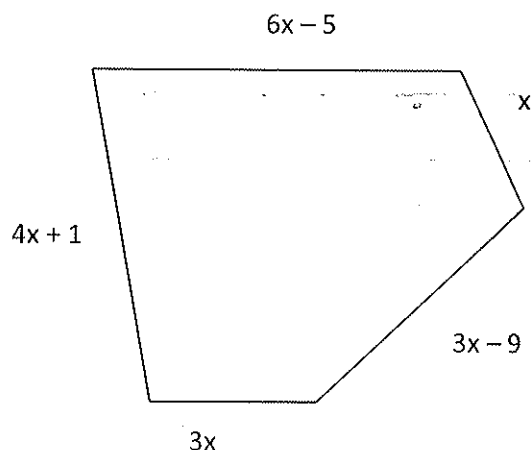
$$A = 7.5x^9y^5z$$

15. Sarah is choosing tiles for her backyard patio. The two tiles she has decided on are pictured below (all sizes in cm):



- a) Determine a simplified expression for the area of each tile (A and B).  $A = 4x^2 + 2x$   
 $B = \frac{3x^2 + 7x}{2}$
- 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).  $76x^2 + 60x$
- 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.  $2200$
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.  $24.75h + 54c$
- b) Last week Katie worked 42 h and makes 4 house calls. How much did she earn?  $\$1255.50$
- 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?  $32 \text{ hours}$
17. A rectangle has side lengths of  $(2x+5)$ cm and  $(5x-9)$  cm. Determine the simplified expression for the **perimeter** of the rectangle.  $P = 14x - 8$
18. Determine the simplified expression for the **area** of a rectangle with sides  $(4x - 5)$  cm long and  $9x$  cm wide.  $A = 36x^2 - 45x$
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.  $2j + 0.5h + 0.25k$
- b) Using your expression, determine how much he makes if he sells 10 hats, 3 jerseys, and 12 key chains.  $\$14$

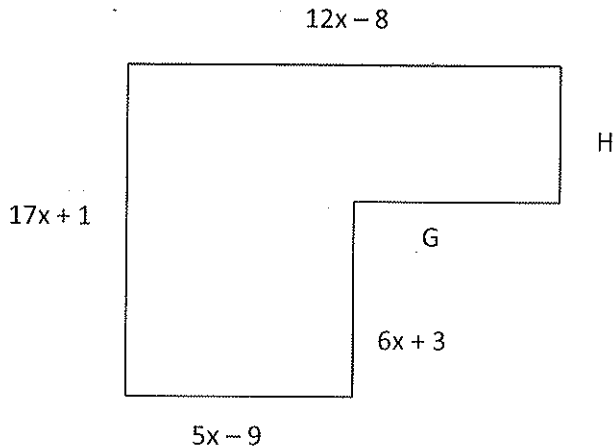
20. Use the diagram below to answer questions a and b.



- a) Express the perimeter of the figure as a simplified polynomial.  $17x - 13$
- b) If the perimeter is 395cm, what is the value of  $x$ ?  $x = 24\text{cm}$
- c) If  $x = 12$ , what is the perimeter?  $191$
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 for one chair:  $160 + 13h$
- b) Represent Kim's bill as a polynomial for one chair:  $75 + 15h$
- 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.  $160 + 13h + 75 + 15h = 235 + 28h$
- d) Calculate the cost for a chair if they both work 5 hours on it.  
 $\$375$
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.  $4r + 5 + r + 5 = 30$
- b) Use your equation to determine their current ages. Cam = 16 Rex = 4
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  $30\text{ m}^2$ . What is the height of the garden?  $h = 2.5$

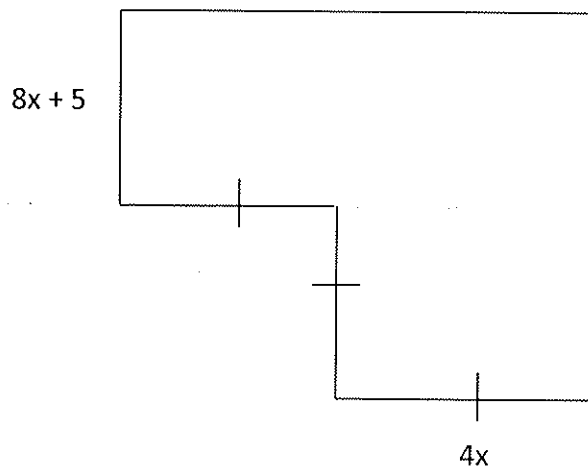
24. Together, Blackie and Jessie have a mass of 72 kg. Blackie's mass is 4 kg less than Jessie's mass. What is each dog's mass?  $Jessie = 38\text{kg}$   $Blackie = 34\text{kg}$

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



- a) Find the expressions for the length of the two missing sides, G and H.  $G = 7x + 1$   
 $H = 11x - 2$
- b) Express the perimeter of the figure as a simplified polynomial.  $58x - 14$
- c) If the perimeter is 275cm, what is the value of x?  $x = 4.98$
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.  $6w + 6$
- b) If perimeter is 30 m, find the **length** and **width** of the rectangle.  $l = 11\text{m}$  ;  $w = 4\text{m}$
- c) Find an algebraic expression for the **area** of the rectangle.  $2w^2 + 3w$
- d) Find the area when  $w = 3$ .  $27$
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.  $h = 600 - 75m$   
 $7.67\text{ minutes}$
28. Determine the simplified expression for the area of a circle with a radius of  $2a^4b^2$   
 $A = \pi 4a^8b^4$

29. For the following shape:



a) State the simplified algebraic expression for the perimeter.  $40x + 10$

b) Find the perimeter when  $x = 3$   $130$

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

Answers will vary. May point out that  $(-2^3)^2$  and  $(-2^2)^3$  are the same.

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.

$$(x^2)(x^3) = 243$$

$$x^5 = 243$$

$$x = 3$$

Explanations will vary.

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.  $T = 5a + 7.50d$

$$1200 = 5a + 7.50d$$

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

100 tickets were sold at the door.

# Midterm Review: Communication Practice

## Questions

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

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

### Student 1 Solution

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

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

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

$$9x = 18$$

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

$$x = 2$$

### Student 2 Solution

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

should have added 3x, instead of subtracting

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

should have subtracted

$$3x = (19) \text{ combined unlike terms}$$

$$3x = 19$$

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

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

- a) Who is correct? *Student 1*  
 b) What mistakes did the incorrect student make?  
 c) Prove who is correct by doing a LS=RS check for each student.

*Student 1*  
 $6(?) + 2 = 20 - 3(?)$

*Student 2*  
 $6(\frac{19}{3}) + 2 = 20 - 3(\frac{19}{3})$

*evaluate completely*

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) *Josie*  
 b) Who made the error and explain what she did incorrectly. *Susie did not distribute the negative before the 5.*

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.
- Like: same variable & exponent*  
*Unlike: different variable and/or exponent*
- Like:  $3x^2$  &  $-x^2$*       *Unlike:  $3x$  &  $-x^2$*



$-5(5)(5)(5)(5)(5) = -15625$        $(-5)(-5)(-5)(-5)(-5)(-5) = 15625$

36. Explain why  $-5^6$  and  $(-5)^6$  are different. Explanations will vary. May include showing the expanded forms.

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

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

①  $\frac{8x^4y^{25}}{6xy^4}$

②

③

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

$$\frac{16x^4y^{10}}{6x^2y^4} = \frac{8}{3}x^2y^6$$

- ① Multiplied  $4 \times 2$  instead of  $4^2$
- ② Did  $5^2$  instead of  $5 \times 2$
- ③ Did not do  $(x)(x) = x^2$

38. John simplified the following expression:

$x^2 + 3x + x^2 + 2x$       c)  $2x^2 + 5x$

$= x^4 + 6x^2$

- a) Describe the error that John made. *Added exponents. (Used multiplication rule)*
- b) How can you convince John that these two expressions are not equal? *Substitute a number into the question and into the answer. Evaluate to prove they're not the same.*
- c) Simplify the expression properly.

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

$$3p^2(5 - p) = -108$$

- a) Explain how you know that you should get the same result both before you expand and after you expand it. *Expanding does not change your solution*
- b) Was it easier to evaluate after you expanded it? Why? *Answers will vary*

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

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

*Should have done  $8 - 2 = 6$*

$$= n^6$$

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

*equal sign*      *no equal sign.*