**Ch 12 Patterns & Equations Practice Test**

**True/False**

*Indicate whether the sentence or statement is true or false.*

*If false, write the corrected statement in the space provided.*

\_\_\_\_ 1. A variable expression contains variables, operations with numbers, and an equal sign.

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\_\_\_\_ 2. You can substitute a letter for a variable to evaluate a variable expression.

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\_\_\_\_ 3. A variable expression for three times a number is 3 + *N*.

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\_\_\_\_ 4. The solution to the equation *x* – 7 = 22 is *x* = 28.

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\_\_\_\_ 5. To solve an equation using systematic trial, you substitute values for the variable until you get the correct answer.

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\_\_\_\_ 6. The perimeter of a rectangle is 48 cm. If the width of the rectangle is 6 cm, then the length is 16 cm.

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\_\_\_\_ 7. When Joelle’s height is increased by 8 and divided by 3, the result is 35 cm. Joelle is 156 cm tall.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_ 8. A hockey team of *n* players enters a tournament. Each player pays $25 for a new hockey jersey. There is an entry fee of $150 for the team. The cost of the tournament can be modelled by the equation *C* = 25*n* + 150.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

\_\_\_\_ 9. A number decreased by 12 equals 5. What was the starting number?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 12 | c. | 9 |
| b. | 7 | d. | 4 |

\_\_\_\_ 10. Study the following pattern of numbers.

|  |  |  |  |
| --- | --- | --- | --- |
| **34** | **31** | **28** |  |
| *n* = 1 | *n* = 2 | *n* = 3 | *n* |

Which equation could model a number in the pattern above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3*n* – 35 = 24 | c. | 26 – 4*n* = 23 |
| b. | 37 – 3*n* = 22 | d. | 22 – 37 = 4*n* |

\_\_\_\_ 11. What is the solution to the equation *z* + 2 = 14?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 14 | c. | 10 |
| b. | 12 | d. | none of the above |

\_\_\_\_ 12. What equation represents “15 less a number is 7”?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 15 – *e* = 7 | c. | 15 – 7 = *e*  |
| b. | 7 – 15 = *e* | d. | 15 = 7 – *e* |

\_\_\_\_ 13. “Triple a number, increased by 4, is 15” can be modelled as

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3*n* – 4 = 15 | c. | 2*n* + 4 = 5 |
| b. | 15 + 4 = 3*n* | d. | 3*n* + 4 = 15 |

\_\_\_\_ 14. Model the following situation using an equation.

Three less than the product of five and a number equals 12.

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 3  5*n* = 12 | c. | 5*n*  3 = 12 |
| b. | 3*n*  5 = 12 | d. | 5*n*  3 = 12 |

\_\_\_\_ 15. If *n* represents the total number of books printed, the total cost in dollars of producing a school yearbook is modelled as 4750 + 8*n*. What would be the total cost of printing 575 yearbooks?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | $9350 | c. | $4750 |
| b. | $5325 | d. | $38 575  |

\_\_\_\_ 16. The expression 2*w* + *t* is used to determine how many points a minor hockey team earns in a season. *w* represents the number of wins and *t* represents the number of ties. If the Knights had 14 wins and 8 ties, how many total points would the team have?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 36 | c. | 28 |
| b. | 30 | d. | 22 |

\_\_\_\_ 17. The length in metres multiplied by 9 is 81.

What equation models the situation described above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *l*  81 = 9 | c. | 9*l* = 81 |
| b. | *l* + 9 = 81 | d. | *l* = 9  81 |

\_\_\_\_ 18. When Grant’s age is doubled and 6 is added to it, the result is 19.

What equation models the riddle above?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 6 + 2 = 19 | c. | 2*a* + 6 = 19 |
| b. | 6*a* + 2 = 19 | d. | 19 = 2 + 6*a* |

\_\_\_\_ 19. Marco has a summer job mowing lawns. He earns $25.00 a day. He also receives a bonus of $2.75 for each lawn he mows. What equation would describe Marco’s daily pay?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | *p* = 25*n* + 2.75 | c. | *p* = 25  2.75*n* |
| b. | *p* = 25*n*  2.75 | d. | *p* = 25  2.75*n* |

**Completion**

*Complete each sentence or statement.*

 20. When 1248 is divided by a number, the result is 16. The number is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 21. In a class of 35 students, there are 9 more boys than girls. How many girls are in the class? Write an equation that helps answer the question. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Matching**

*Match each situation to the most appropriate equation.*

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  = 3 | d. | *n* = 12  7 |
| b. | *n* + 7 = 15 | e. | *n* + 1.9 = 11 |
| c. | 2(6 + *n*) = 16 | f. | 7*n* = 49 |

\_\_\_\_ 22. A number increased by 1.9 is 11.

\_\_\_\_ 23. Half a number is 7 less than 12.

\_\_\_\_ 24. Two times the sum of 6 and a number equals 16.

\_\_\_\_ 25. The sum of a number and 7 is 15.

\_\_\_\_ 26. The product of 7 and a number is 49.

**Short Answer**

*Write your answer in the space provided.*

 27. If a cup represents an unknown number, write a variable expression modelled by the following diagram.

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 28. A laser printer prints 957 words per second. Write an expression for the number of words the printer prints in *q* minutes.

 29. Write a word statement to describe the expression *t* + 5.

 30. A clothing store is selling jeans at $3 off the regular price. Write an expression to show the sale price.

 31. If *S* represents the number of metres a train travels in 30 min, write an expression for the number of metres travelled by the train in 1 min.

 32. A sum of money is divided among 3 people. Each person receives $25.35. What is the sum of money?

 33. The sum of two numbers is 18. The first number doubles the second. What are the numbers?

 34. Solve the following equation. Use a method of your choice.

3*x* + 5 = 14

 35. Denise made an error when she solved the following equation. Find the error, explain what it is, and correct it.



 36. Write an equation for the following situation. Solve your equation to find Rosa’s age.

Warren is 28 years old. He is 6 years older than Gloria, whose age is twice Rosa’s.

**Problem**

*Write your answer in the space provided.*

 37. Joey is selling his CD player and 14 CDs. He is selling both the CD player and the CDs for $332. If the CD player costs $150, what is the value of each CD? Write an equation to help you solve the problem.

 38. John joined a skating competition. John’s score times the degree of difficulty gives the total number of points John received. John received 79.75 points. The degree of difficulty was 2.9. What was John’s score?

 39. Pilots use the following equations to determine the ground speed of an airplane.

ground speed = air speed + tail wind speed

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *g* | = | *a* | + | *t* |

Or

ground speed = air speed  head wind speed

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *g* | = | *a* | – | *h* |

Calculate the ground speed with the following wind conditions:

a) air speed = 940 km/h, head wind speed = 78 km/h

b) If there is a tail wind of 135 km/h, what air speed should a pilot fly to maintain a ground speed of 1325 km/h?

**Ch 12 Patterns & Equations Practice Test**

**Answer Section**

**TRUE/FALSE**

 1. ANS: F

A variable expression contains no equal signs.

DIF: Level 2 REF: Knowledge/Understanding OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Expression

 2. ANS: F

You can substitute a number for a variable to evaluate a variable expression.

DIF: Level 2 REF: Knowledge/Understanding OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Equation

 3. ANS: F

The correct expression is 3*N*.

DIF: Level 2 REF: Application OBJ: Section 12.1 STO: PA-7m66

TOP: Patterning and Algebra KEY: Expression

 4. ANS: F

The solution to the equation *x* – 7 = 22 is *x* = 29.

DIF: Level 3 REF: Application OBJ: Section 12.2 STO: PA-7m68

TOP: Patterning and Algebra KEY: Equation

 5. ANS: T DIF: Level 2 REF: Knowledge/Understanding

OBJ: Section 12.4 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 6. ANS: F

If the width of the rectangle is 6 cm, then the length is 18 cm.

DIF: Level 2 REF: Application OBJ: Section 12.5 STO: PA-7m68

TOP: Patterning and Algebra KEY: Equation

 7. ANS: F

Joelle is 97 cm tall.

The equation is

**(h+8) / 3 =35**

 **[(156) + 8] / 3 = 35**

**164 / 3=35**

**54.6666 ≠** **35**

**Therefore Joelle's height is not 156cm tall.**

You simply **substitute**the height that Joelle had, create the equation and test it.

At the end, the left side of the equation DID NOT equal the right side. (So it was an unbalanced equation). This proved that the height substituted in was wrong.

**False**is the answer to that question.

Joelle's real height was 97cm tall.

My proof is...

      (h+8)/ 3 = 35

 (h+8)/ 3 x 3 = 35 x 3

          h + 8 = 105

      h + 8 - 8 = 105 - 8

                 h = 97

**∴** Joelle is 97 cm tall.

DIF: Level 3 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 8. ANS: T DIF: Level 3 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.5 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

**MULTIPLE CHOICE**

 9. ANS: B DIF: Level 3 REF: Communication

OBJ: Section 12.3 STO: PA-7m66 TOP: Patterning and Algebra

KEY: Equation

 10. ANS: B DIF: Level 2 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.3 STO: PA-7m67 TOP: Patterning and Algebra

KEY: Equation

 11. ANS: B DIF: Level 2 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.4 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 12. ANS: A DIF: Level 2 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.4 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 13. ANS: D DIF: Level 3 REF: Application OBJ: Section 12.4

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 14. ANS: C DIF: Level 3 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.4 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 15. ANS: A DIF: Level 2 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.5 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 16. ANS: A DIF: Level 2 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.5 STO: PA-7m66 TOP: Patterning and Algebra

KEY: Equation

 17. ANS: C DIF: Level 2 REF: Application OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 18. ANS: C DIF: Level 3 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.5 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

 19. ANS: C DIF: Level 3 REF: Thinking/Inquiry/Problem Solving

OBJ: Section 12.5 STO: PA-7m68 TOP: Patterning and Algebra

KEY: Equation

**COMPLETION**

 20. ANS:

78

Rationale:

1248  *t* = 16

*t* = 78

DIF: Level 1 REF: Application OBJ: Section 12.2 STO: PA-7m68

TOP: Patterning and Algebra KEY: Equation

 21. ANS:

2*g* + 9 = 35

Rationale:

Girls: *g*

Boys: *g* + 9

*g* + *g* + 9 = 35

DIF: Level 3 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

**MATCHING**

 22. ANS: E DIF: Level 2 REF: Application OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 23. ANS: D DIF: Level 2 REF: Application OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 24. ANS: C DIF: Level 2 REF: Application OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 25. ANS: B DIF: Level 2 REF: Application OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 26. ANS: F DIF: Level 2 REF: Application OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

**SHORT ANSWER**

 27. ANS:

*c* + 4, where *c* is the unknown number

DIF: Level 2 REF: Application OBJ: Section 12.1 STO: PA-7m66

TOP: Patterning and Algebra KEY: Expression

 28. ANS:

957  60  *q =* 57420*q*

The number of words the printer print in *q* minutes is 57 420*q*.

DIF: Level 2 REF: Knowledge/Understanding OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Expression

 29. ANS:

a number increased by 5

DIF: Level 2 REF: Knowledge/Understanding OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Expression

 30. ANS:

*R*  3, where *R* is the regular price

DIF: Level 2 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Equation

 31. ANS:

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DIF: Level 2 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.1

STO: PA-7m66 TOP: Patterning and Algebra KEY: Equation

 32. ANS:

**, where *S* represents the sum of money

The sum of money is $76.05.

DIF: Level 3 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.3

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 33. ANS:

*n* + 2*n* = 18

3*n* = 18

*n* = 6

2*n* = 12

The numbers are 6 and 12.

DIF: Level 2 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.4

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 34. ANS:

*x* = 3, by systematic trial

DIF: Level 3 REF: Knowledge/Understanding OBJ: Section 12.4

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

 35. ANS:

Denise should not have multiplied 20 by 5 to solve for *y*. Instead, she should divide 20 by 5, or use systematic trial to arrive at the solution *y* = 4. The answer should read *y* = 4.

DIF: Level 2 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.5

STO: PA-7m66 TOP: Patterning and Algebra KEY: Equation

 36. ANS:

*n* represents Rosa’s age.



DIF: Level 3 REF: Knowledge/Understanding OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation

**PROBLEM**

 37. ANS:



The value of each CD is $13.

DIF: Level 3 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Expression

 38. ANS:



John’s score was 27.5.

DIF: Level 4 REF: Application OBJ: Section 12.5 STO: PA-7m68

TOP: Patterning and Algebra KEY: Equation

 39. ANS:

a) *g* = *a*  *h*

*g* = 940  78

*g* = 862

The ground speed is 862 km/h.

b) 

The pilot should maintain an air speed of 1190 km/h.

DIF: Level 4 REF: Thinking/Inquiry/Problem Solving OBJ: Section 12.5

STO: PA-7m68 TOP: Patterning and Algebra KEY: Equation