Name: _____ **Date:** _____ **Block:** _____

Ms.Stromgren

A1 A2 A4 EXPONENTS -- PRACTICE Math 9 H

Multiple Choice -- *Write your answer on the line beside the question (1 mark each)*

1. Which of the following repeated multiplication forms represents the area of a square with a side length of 2?
   A) 2×4
   B) 2×2
   C) $2 \times 2 \times 2 \times 2$
   D) $2 \times 2 \times 2 \times 4$

2. Which of the following represents $1 \times 1 \times 1 \times 1$ in exponential form?
   A) 1
   B) 1^4
   C) 4
   D) 4^1

3. Determine the volume of a cube that has a side length of 13 cm.
   A) 39 cm^2
   B) 78 cm^3
   C) 169 cm^2
   D) 2197 cm^3

4. What is another way of expressing 7^3?
   A) 3^7
   B) 7×3
   C) $7 \times 7 \times 7$
   D) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

5. In the expression 7^4, what does the number 4 represent?
   A) base
   B) exponent
   C) multiple
   D) power

6. In the expression 5^9, what does the number 5 represent?
   A) base
   B) exponent
   C) multiple
   D) power

7. Express 2187 as a power of 3.
   A) 3×729
   B) 3^7
   C) 7^3
   D) 729^3

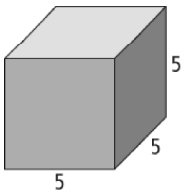
8. Express 4096 as a power of 8.
   A) 3^8
   B) 4^8
   C) 8^3
   D) 8^4

9. Which power has the greatest value? -32^2, 4^6, $(-5)^4$, 2^{10}
   A) 2^{10}
   B) 4^6
   C) $(-5)^4$
   D) -32^2

10. Evaluate the power $(-3)^5$.
    A) 243
    B) 15
    C) –15
    D) –243

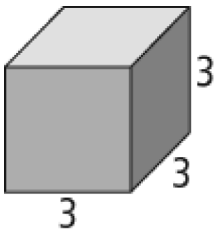
11. What is the value of -4^6?
    A) –4096
    B) –24
    C) 24
    D) 4096

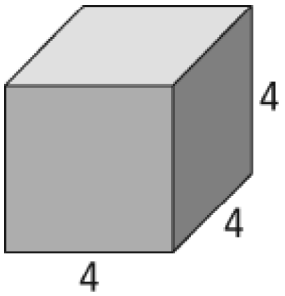
12. Which expression best represents the diagram below?

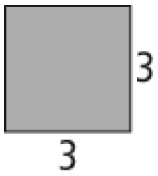


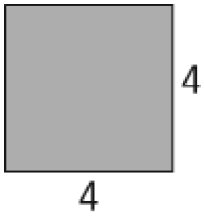
A) 3×5
B) 15
C) 3^5
D) 5^3

13. Which diagram represents the power 4^3?

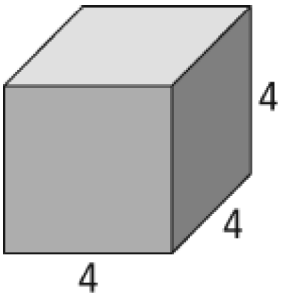
A) 

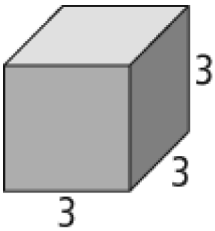
B) 

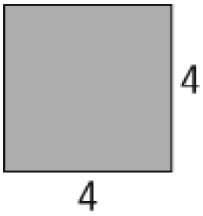
C) 

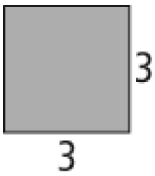
D) 

14. Which diagram represents the power 3^3?

A) 

B) 

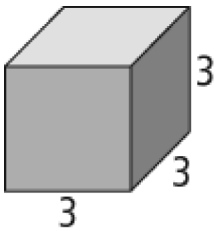
C) 

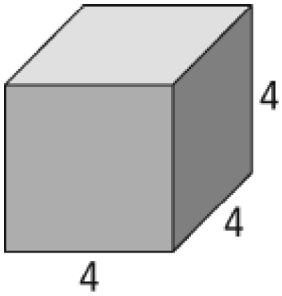
D) 

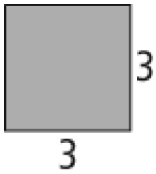
15. Express $7^2 \times 7^4$ as a single power.
A) 7^2
B) 7^4
C) 7^6
D) 7^8

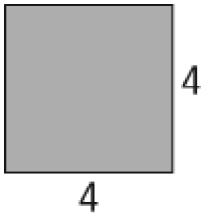
16. Express $7^2 \times 7^6$ as a single power.
A) 7^2
B) 7^4
C) 7^8
D) 7^{12}

17. Which diagram represents the power 3^2?

A) 

B) 

C) 

D) 

18. Evaluate $\frac{7^6}{7^2}$.
A) 7^2
B) 7^4
C) 7^6
D) 7^8

19. Evaluate $\frac{5^7}{5^3}$.
A) 3125
B) 625
C) 125
D) 25

20. What is the value of $\frac{(-5)^6}{(-5)^3}$?
A) –5
B) –25
C) –125
D) –625

21. Express $(-4)^3 \times (-4)^9$ as a single power.
A) $(-4)^3$
B) $(-4)^6$
C) $(-4)^{12}$
D) $(-4)^{18}$

22. Evaluate $(-6)^4 \times (-6)^2$.
A) 1 679 616
B) 46 656
C) 1296
D) 36

23. Evaluate 7^0.
A) 0
B) 1
C) 7
D) 70

24. Determine the value of $(-3)^0$.
A) –3
B) –1
C) 0
D) 1

25. What is the value of $\left(\frac{3}{8}\right)^0$?
A) 0
B) $\frac{3}{8}$
C) 1
D) $\frac{8}{3}$

26. Simplify $\left(3^2\right)^{-3}$.

A) -3^6

B) $-\frac{1}{3^6}$

C) $\frac{1}{3^6}$

D) 3^6

27. Simplify $\frac{\left(-3^2\right)^{-3}}{\left(-3^3\right)^{-2}}$.

A) -3^6
B) 0
C) 1
D) 3^6

28. What is the value of $\frac{3}{32} \times \frac{2}{3^3}$?

A) $\frac{1}{16}$

B) $\frac{1}{54}$

C) $\frac{1}{144}$

D) $\frac{1}{243}$

29. Evaluate $\left(\frac{2}{3}\right)^3 \times \left(\frac{2}{3}\right)^2$.

A) $\frac{4}{9}$

B) $\frac{8}{27}$

C) $\frac{32}{243}$

D) $\frac{1024}{59\,049}$

30. What is $9^3 \div (9 - 6)$?
A) 27
B) 75
C) 81
D) 243

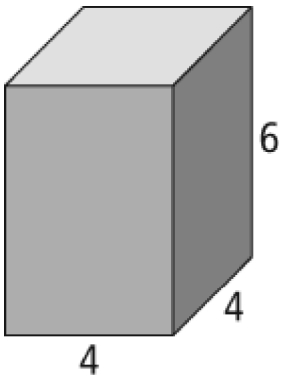
31. What is $(8^2 - 2^4) \div 2^3 - 4$?
A) 0
B) 2
C) 12
D) 24

32. What is $(8 + 4)^2 - (4^3 - 2^5) \div 4$?
A) 12
B) 28
C) 72
D) 136

33. What is the value of $\frac{4^3 + 2^4}{2^3 \times 5}$?

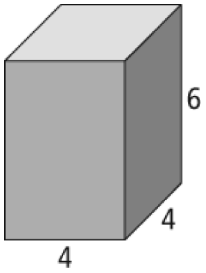
A) 50
B) 10
C) 2
D) 1

34. Which of the following expressions represents the surface area of this rectangular prism?



A) $4^2 \times 6$
B) $4^2 + (4 \times 6)$
C) $(2 \times 4^2) + (6 \times 4^2)$
D) $4^2 + 4 \times (4 \times 6)$

35. Determine the surface area of the rectangular prism.

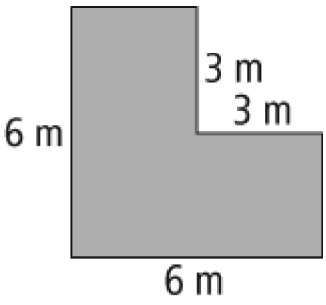


A) 960 units^2
B) 128 units^2
C) 44 units^2
D) 40 units^2

36. When evaluating the expression $6^3 \div (6 - 3)$, which operation should be completed first?
A) addition
B) brackets
C) division
D) exponent

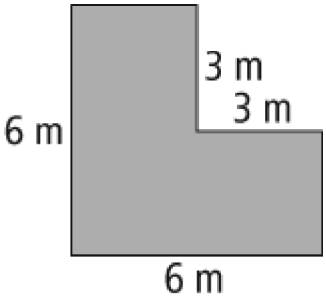
37. When evaluating the expression $4^3 \div (8 - 9 \times 2)$, what is the last operation to be completed?
A) addition
B) brackets
C) division
D) exponent

38. An L-shaped flower garden is shown below. Which of the following expressions represents the area of the garden?



A) $6^2 + 3^2$
B) $6^2 - 3^2$
C) $6^2 \times 3^2$
D) $6^2 \div 3^2$

39. Jory makes a flower garden as shown below. What is the area of this garden?

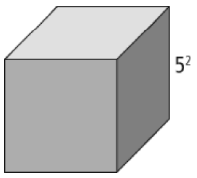


A) 4 units^2
B) 27 units^2
C) 44 units^2
D) 324 units^2

40. The population of marmots on Mount Washington is 5000. If the growth of the marmot population is 2% per year, what will be the population in 15 years?
A) 5030
B) 6730
C) 76 500
D) 77 035

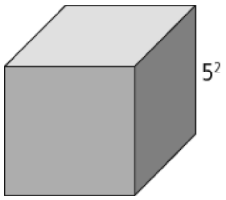
41. The population of deer on Mount Washington is 2500. If the growth of the deer population is 1.5% per year, determine the expression that can be used to calculate the deer population after n years.
A) $P = 2500(1.5)^n$
B) $P = 2500(1.015)^n$
C) $P = 2500(1.15)^n$
D) $P = 2500(0.015)^n$

42. Which expression represents the surface area of one face of the cube?



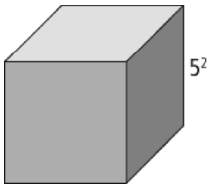
A) 2×5^2
B) $5^2 \times 5^2 \times 5^2$
C) 5^4
D) 5×5

43. What is the surface area of the cube?



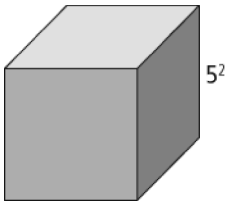
A) 25 units^2
B) 125 units^2
C) 1875 units^2
D) 3750 units^2

44. Determine which expression represents the volume of the cube.



A) 2×5^2
B) $5^2 \times 5^2$
C) 5^6
D) $5 \times 5 \times 5$

45. Calculate the volume of the cube.



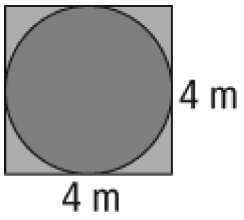
A) 25 000 units^3
B) 15 625 units^3
C) 3750 units^3
D) 1875 units^3

46. If a colony of 1000 bacteria doubles in size every 2 h, what is the size of the colony after 6 h?
A) 2000
B) 6000
C) 8000
D) 64 000

47. A colony of 500 bacteria triples in size every 1.5 h. Determine the size of the colony after 6 h.
A) 2598
B) 3000
C) 20 250
D) 40 500

48. The kinetic energy, in joules (J), of a moving object can be calculated using the formula $E = \frac{1}{2}mv^2$, where m is the mass (in kg) of the object and v is the velocity (in m/s) of the object. How much kinetic energy does a 1500-kg car travelling at a speed of 28 m/s have?
A) 1 176 000 J
B) 588 000 J
C) 42 000 J
D) 21 000 J

49. A square flooring tile has a circular design printed on it. If the tile is 4 m long on each side, what is the area of the tile not covered by the design?



A) 0.86 m^2
B) 3.43 m^2
C) 13.73 m^2
D) 205.74 m^2

50. Which powers are equal in value? $(-32)^2$, 4^6, $(-5)^4$, 2^{10}
A) 4^6 and $(-5)^4$
B) $(-5)^4$ and 2^{10}
C) $(-32)^2$ and 2^{10}
D) $(-32)^2$ and 4^6

Completion *Complete each statement. (1 mark each)*

51. When multiplying powers with the same base, keep the base the same and _____ the exponents.

52. To simplify a power of a power, such as $\left(3^2\right)^3$, keep the base the same and _____ the exponents.

53. Any base raised to the exponent of zero equals _____.

54. The power $\left(5^2\right)^4$, when written as a single exponent, is equal to _____.

55. The volume of a cube with side lengths of 12 cm is _____.

56. The power $\left(7^8\right)^0$, when written as a single exponent, is equal to _____.

57. $(9+3)^2 - \left(6^2 + 3^3\right)$ equals _____.

58. $(5^2 + 4^3 - 8^2) =$ _____

59. $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$ expressed as a power is _____.

60. 243 expressed as a power with base 3 is _____.

Matching

Match the correct answer to the expression in each question. An answer may be used more than once or not at all.

A) 7^6
B) 4^3
C) 3^4
D) 140
E) 134
F) 9

61. $\left(2^2\right)^3$

62. $3^6 \div 3^2$

63. $6 + (4^3 \times 2)$

64. $3^3 \div \left(3^3 \div 9\right)$

65. $\frac{7^7}{7}$

Match the correct term to each of the following descriptions.A term may be used more than once or not at all.

A) base
B) exponent
C) exponential form
D) power
E) standard form
F) scientific notation

66. represents the number of times you multiply a number by itself

67. used to represent $2 \times 2 \times 2 \times 2$ as 2^4

68. refers to an expression such as 5^2 or 2^4

69. the number 5 in the expression 5^1

70. the number 2 in the expression 5^2

Short Answer

Write your answer in the space provided.

71. Express each number as a product of two powers.
a) 100
b) 108

72. Write each expression as a power.
a) $9 \times 9 \times 9 \times 9$
b) $4 \times 4 \times 4 \times 4 \times 4$
c) $-1 \times -1 \times -1$
d) $6 \times 6 \times 6 \times 6 \times 6 \times 6$

73. Evaluate each expression.

a) 64 as a power of 2 **c)** 1296 as a power of 6
b) 243 as a power of 3 **d)** 4096 as a power of 8

74. Write each power as repeated multiplication, and evaluate.

a) 7^4 **c)** 12^3
b) 11^3 **d)** 5^5

75. Determine the area of a square with each side length below.

a) 7 cm **c)** 420 mm
b) 13 m **d)** 2.5 km

76. Given the side lengths below, calculate the volume of each cube.

a) 8 cm **c)** 50 mm
b) 14 m **d)** 0.6 km

77. Evaluate.

a) $10 \times 4 + 6^3$ **c)** $8^2 \div 4 + 2^2$
b) $5 \times 2^5 - 6^2 \times 2$ **d)** $2 \times 5^3 \div (35 - 5^2)$

78. Evaluate.

a) $4 \times (9^2 + 3^2 \times 2)$ **c)** $(7^3 - 3^3) \div 4 - (7^2 + 30)$
b) $5^4 - (8^3 - 2^5 \times 3)$ **d)** $10 \times (4^3 - 6^2) + 2 \times (8^2 - 4^2)$

79. Evaluate.

a) $\dfrac{6^3 - 4^3}{2\left(2^2 \times 19\right)}$ **c)** $\left(\dfrac{4 - 6^3}{5^2 - 3}\right) - 2^3$

b) $(82 - 2) - 2\left(\dfrac{3^3 - 2^7}{5}\right)$ **d)** $\left(\dfrac{9^3 - 36}{8^2 \times 4}\right) + 3\left(\dfrac{2^5}{4^2}\right)$

80. Write an expression using exponents, and determine the total area of a pair of squares, given their side lengths.

a) 6 cm, 7 cm
b) 4 cm, 9 cm

81. Determine the sum of the volumes of the two cubes with the side lengths given below.

a) 0.5 cm, 0.8 cm
b) 1.3 cm, 10 cm

Word Problems

82. The number of insects in a colony doubles every month. There are currently 1000 insects in the colony. How many insects will there be after one year?

83. A culture of 100 000 bacteria triples every hour. How many bacteria were there 3 h ago?

84. Kevin explained to Brad that $4^6 \div 4^2 = 4^3$.
a) Was Kevin's explanation correct or incorrect? Explain your thinking.
b) Evaluate $4^6 \div 4^2$.

85. The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Find the volume of the sphere if it has a diameter of 12cm.

A1 A2 A4 EXPONENTS -- PRACTICE Math 9 H
Answer Section

MULTIPLE CHOICE

1.	ANS: B	OBJ: Section 3.1
2.	ANS: B	OBJ: Section 3.1
3.	ANS: D	OBJ: Section 3.1
4.	ANS: C	OBJ: Section 3.1
5.	ANS: B	OBJ: Section 3.1
6.	ANS: A	OBJ: Section 3.1
7.	ANS: B	OBJ: Section 3.1
8.	ANS: D	OBJ: Section 3.1
9.	ANS: B	OBJ: Section 3.1
10.	ANS: D	OBJ: Section 3.1
11.	ANS: A	OBJ: Section 3.1
12.	ANS: D	OBJ: Section 3.1
13.	ANS: B	OBJ: Section 3.1
14.	ANS: B	OBJ: Section 3.1
15.	ANS: C	OBJ: Section 3.2
16.	ANS: C	OBJ: Section 3.2
17.	ANS: C	OBJ: Section 3.1
18.	ANS: B	OBJ: Section 3.2
19.	ANS: B	OBJ: Section 3.2
20.	ANS: C	OBJ: Section 3.2
21.	ANS: C	OBJ: Section 3.2
22.	ANS: B	OBJ: Section 3.2
23.	ANS: B	OBJ: Section 3.2
24.	ANS: D	OBJ: Section 3.2
25.	ANS: C	OBJ: Section 3.2
26.	ANS: C	OBJ: Section 3.2
27.	ANS: C	OBJ: Section 3.2
28.	ANS: C	OBJ: Section 3.3
29.	ANS: C	OBJ: Section 3.3
30.	ANS: D	OBJ: Section 3.3
31.	ANS: B	OBJ: Section 3.3
32.	ANS: D	OBJ: Section 3.3
33.	ANS: C	OBJ: Section 3.3
34.	ANS: C	OBJ: Section 3.3
35.	ANS: B	OBJ: Section 3.3

36. ANS: B OBJ: Section 3.3
37. ANS: C OBJ: Section 3.3
38. ANS: B OBJ: Section 3.3
39. ANS: B OBJ: Section 3.3
40. ANS: B OBJ: Section 3.4
41. ANS: B OBJ: Section 3.4
42. ANS: C OBJ: Section 3.4
43. ANS: D OBJ: Section 3.4
44. ANS: C OBJ: Section 3.4
45. ANS: B OBJ: Section 3.4
46. ANS: C OBJ: Section 3.4
47. ANS: D OBJ: Section 3.4
48. ANS: B OBJ: Section 3.4
49. ANS: B OBJ: Section 3.4
50. ANS: C OBJ: Section 3.1

COMPLETION

51. ANS: add

    OBJ: Section 3.2
52. ANS: multiply

    OBJ: Section 3.2
53. ANS:
    1
    one

    OBJ: Section 3.2
54. ANS: 5^8

    OBJ: Section 3.1
55. ANS: $12^3 = 1728\ cm^3$

    OBJ: Section 3.4
56. ANS: 7^0

    OBJ: Section 3.2
57. ANS: 81

    OBJ: Section 3.3
58. ANS: 25

    OBJ: Section 3.3

59. ANS: 9^8

    OBJ: Section 3.1
60. ANS: 3^5

    OBJ: Section 3.1

MATCHING

61. ANS: B OBJ: Section 3.2
62. ANS: C OBJ: Section 3.2
63. ANS: E OBJ: Section 3.3
64. ANS: F OBJ: Section 3.3
65. ANS: A OBJ: Section 3.2

66. ANS: B OBJ: Section 3.1
67. ANS: C OBJ: Section 3.1
68. ANS: D OBJ: Section 3.1
69. ANS: A OBJ: Section 3.1
70. ANS: B OBJ: Section 3.1

SHORT ANSWER

71. ANS:
    Example:
    a) $100 = 2^2 \times 5^2$
    b) $108 = 2^2 \times 3^3$
    c) $72 = 2^1 \times 6^2$
    d) $2500 = 10^2 \times 5^2$

    OBJ: Section 3.1
72. ANS:
    a) 9^4 **c)** -1^3
    b) 4^5 **d)** 6^6

    OBJ: Section 3.1
73. ANS:
    a) 2^6 **c)** 6^4
    b) 3^5 **d)** 8^4

    OBJ: Section 3.1

74. ANS:
a) $7 \times 7 \times 7 \times 7 = 2401$ **c)** $12 \times 12 \times 12 = 1728$
b) $11 \times 11 \times 11 = 1331$ **d)** $5 \times 5 \times 5 \times 5 \times 5 = 3125$

OBJ: Section 3.1

75. ANS:
a) 49 cm^2 **c)** 176 400 mm^2
b) 169 m^2 **d)** 6.25 km^2

OBJ: Section 3.4

76. ANS:
a) 512 cm^3 **c)** 125 000 mm^3
b) 2744 m^3 **d)** 0.216 km^3

OBJ: Section 3.4

77. ANS:
a) 256 **c)** 20
b) 88 **d)** 25

OBJ: Section 3.3

78. ANS:
a) 396 **c)** 0
b) 209 **d)** 376

OBJ: Section 3.3

79. ANS:
a) 1 **c)** –17.6
b) 120.4 **d)** 8.7

OBJ: Section 3.3

80. ANS:
a) $6^2 + 7^2 = 85$ cm^2
b) $4^2 + 9^2 = 97$ cm^2

OBJ: Section 3.4

81. ANS:
a) $0.5^3 + 0.8^3 = 0.637$ cm^3
b) $1.3^3 + 10^3 = 1002.197$ cm^3

OBJ: Section 3.4

PROBLEM

82. ANS:
Let P represent the population of insects.
$P = 1000(2)^{12}$

$P = 1000(4096)$

$P = 4\,096\,000$
After one year, there will be 4 096 000 insects in the colony.

OBJ: Section 3.4

83. ANS:
Let P represent the population of bacteria.
$P = 100\,000(3)^{-3}$

$P = 100\,000\left(0.0\overline{37}\right)$

$P \approx 3703.7$
There were approximately 3704 bacteria 3 h ago.

OBJ: Section 3.4

84. ANS:
a) Kevin's explanation was incorrect. When dividing powers, the exponents should be subtracted. Kevin divided the exponent.

b) $4^6 \div 4^2 = 4^{(6-2)}$

$= 4^4$

$= 256$
The correct answer is 256.

OBJ: Section 3.2

85. ANS:

$$\frac{4}{3}\pi r^3$$
$$\frac{4}{3}\pi(6)^3$$
$$\frac{4}{3}\pi 216$$
$$\frac{4}{3}678.24$$
$$\frac{4 \times 678.24}{3}$$
$$904.32cm^3$$

OBJ: Section 3.3