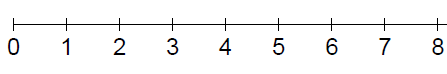
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| **1.1: Number Systems** |

1. Use check marks to indicate *all* the sets to which each number belongs:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | ***N*** | ***W*** | ***I*** | ***Q*** |  | ***R*** |
| a. |  |  |  |  |  |  |  |
| b. |  |  |  |  |  |  |  |
| c. | -2 |  |  |  |  |  |  |
| d. |  |  |  |  |  |  |  |
| e. | 9.5 |  |  |  |  |  |  |
| f. |  |  |  |  |  |  |  |
| g. |  |  |  |  |  |  |  |
| h. |  |  |  |  |  |  |  |
| i. |  |  |  |  |  |  |  |
| j. |  |  |  |  |  |  |  |
| k. |  |  |  |  |  |  |  |
| l. |  |  |  |  |  |  |  |

1. Write one number that satisfies each condition:
   1. An integer, but not a whole number.
   2. A rational number, but not an integer.
   3. A real number, but not a rational number.
   4. A whole number, but not a natural number.
   5. An irrational number, but not a rational number.
   6. A negative rational number that is not a decimal.
   7. A number that looks irrational but is actually rational.
2. Order the below numbers by placing an ‘A’ under the smallest number, a ‘B’ under the next smallest and so on.
3. Complete the following statements using *always*, *sometimes*, or *never.*
   1. A whole number is ­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a natural number.
   2. The quotient of two integers is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ an integer.
   3. A whole number is \_\_\_\_\_\_\_\_\_ a rational number.
   4. The difference between two integers is \_\_\_\_\_\_\_\_\_\_\_\_\_ an integer
   5. The square root of a number is \_\_\_\_\_\_\_\_\_\_\_\_ in set
   6. A negative number is \_\_\_\_\_\_\_\_\_\_\_\_ in set *W*.
   7. A number in set *N* is \_\_\_\_\_\_\_\_\_\_\_\_\_ a number in set *R*.
4. Determine whether each statement is true (T) or false (F).
   1. \_\_\_\_\_ All natural numbers are integers.
   2. \_\_\_\_\_ Real numbers consist of rational numbers and irrational numbers.
   3. \_\_\_\_\_ The set of integers is nested within the set of rational numbers.
   4. \_\_\_\_\_ All integers are rational numbers.
   5. \_\_\_\_\_ All irrational numbers are real.
   6. \_\_\_\_\_ The set *R* is nested within the set *N*.
   7. \_\_\_\_\_ The set *Q* is nested within the set *W*.
   8. \_\_\_\_\_ There is only one number in set *W* which is not also in set *N*.
5. Place the letter that corresponds to the appropriate dot on the following number line below.



1. Use estimates to explain why .
2. This statement is true: Explain why

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| **1.2: Prime Numbers and Their Applications** |

1. Classify the following whole numbers as prime (P) or composite (C).

a. 30 b. 41 c. 43 d. 57 e. 59 f. 121 g. 133 h. 169 i. 197 j. 201 k. 227

1. a. State all the factors of 20:

b. State the prime factors of 20:

c. Express 20 as a product of prime factors:

1. In each case, write the number as a product of prime factors.

a) 189 b)685 c)4235 d)7980

1. Determine the greatest common factor of:
   1. 483 and 575
   2. 180 and 504
   3. 66 and 495 and 2541
2. State the lowest common multiple of
   1. 4 and 6 c. 9 and 15
   2. 3 and 9 d. 40 and 60 and 100
3. Determine the lowest common multiple of:
   1. 14 and 30
   2. 28 and 60
   3. 58 and 124

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| **1.3: Perfect Squares and Cubes** |

1. Determine if each of the numbers in the left column is a perfect square, perfect cube, or neither. Then draw an arrow to the correct answer in the right hand column.

Perfect Square

Perfect Cube

Neither

|  |
| --- |
| **1.4: Radicals** |

1. Identify the index and radicand in each of the following.

|  |  |  |
| --- | --- | --- |
| a) | b) | c) |
| Index: | Index: | Index: |
| Radicand: | Radicand: | Radicand: |
| d) 17 | e) | f)– |
| Index: | Index: | Index: |
| Radicand: | Radicand: | Radicand: |

1. Explain the meaning of the index 4 in the radical . Calculate to four decimal places.
2. Identify whether each radical is written as a mixed radical or an entire radical.
   1. b. c. d.
3. Convert the following radicals to mixed radicals in simplest form.
4. b. c. d.
5. f. g. h.
6. Convert the following radicals to mixed radicals in simplest form. There is one which cannot be converted. Identify it and explain why it cannot be converted to a mixed radical.
7. b. c. d.
8. f. g. h.
9. Convert the following radicals to mixed radicals in simplest form.
10. b. c. d.
11. f. g. h.
12. Convert the following to entire radical form.
13. b. c. d.
14. f. g. h.
15. Arrange the following radicals in order from least to greatest by writing an ‘A’ under the smallest number, a ‘B’ under the next smallest and so on.
16. Three of the four following radicals are equal to each other. Without using a calculator, find the one that is different and circle it.

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| **1.5: Exponents** |

1. Use the Product Law to simplify.
   1. b. c. d. e.
2. Use the Quotient Law to simplify.
   1. b. c. d. e.
3. Use the Power of a Product Law to simplify and evaluate if necessary.
   1. b. c. d. e.
4. g. h. i. j.
5. Use the Power of a Quotient Law to simplify and evaluate if necessary.
   1. b. c. d. e.
6. Use the Power of a Power Law to simplify.
   1. b. c. d. e.
7. State the value of in each of the following.
   1. b. c.
8. e. f.
9. Use the exponent laws to simplify and evaluate if necessary.
   1. b. c. d.
10. f. g. h.
11. Simplify and evaluate if necessary.
    1. b. c. d.
12. f. g. h.
13. Determine the value of *p*, *q*, *r*, and *s* and write them, in that order, in the boxes provided.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| *p* | *q* | *r* | *s* |

1. If then the value of is: \_\_\_\_\_\_\_\_
2. Simplify:
   1. b. c.
3. e. f.
4. Write in simplest form.
   1. b. c. d.
5. Write each expression in simplest form without brackets.
   1. b.
6. Simplify:
7. Simplify:
8. Express each with positive exponents.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a. |  | b. |  | c. |  | d. |  | e. |  |
|  |  |  |  |  |  |  |  |  |  |
| f. |  | g. |  | h. |  | i. |  | j. |  |
|  |  |  |  |  |  |  |  |  |  |

1. Simplify and write your answer with positive exponents.
   1. b. c. d.
2. Simplify and write you answer with positive exponents.
   1. b. c. d.
3. f. g. h.
4. Simplify each expression and write you answer with positive exponents.
   1. b. c.
5. e. f.
6. Write an equivalent expression using radicals.
   1. b. c. d.
7. f. g. h.
8. j. k. l.
9. Assuming represents a positive integer, why do the following expressions have no meaning?

1. A cube has a volume of 216 cm3.
   1. Write a power which represents the edge length of the cube.
   2. Write a power which represents the surface area of the cube.
   3. Calculate the exact edge length and surface area of the cube.
2. A cube has a volume of V cm3.
   1. Write a power and a radical which represents the edge length of the cube.
   2. Write a power and a radical for the area of one of the faces of the cube.
3. Determine the value of .
   1. b. c.
4. e. f.
5. Simplify the following. Write each expression as a power with positive exponents and then as an entire radical.
   1. b. c. d.
6. f. g. h.
7. Write each radical as a power in the form (*n* is fractional).
   1. b. c. d. e.
8. Write as a power and evaluate.
   1. b. c.

Unit 1: Roots and Powers Practice Booklet Key

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| **1.1: Number Systems** |

1. a) Q, R b) N, W, I, Q, R c) I, Q, R d) Q, R e) Q, R

f) , R g) , R h) Q, R i) I, Q, R j) Q, R

k)Q, R l) Q, R

1. a) any negative b) any fraction c) a non-terminating and non-repeating decimal

d) 0 e) a non-terminating and non-repeating decimal

f) -1, -2, -3, … g) ie.

1. E, A, D, B, F, C
2. a) sometimes b) sometimes c) always d) always

e) sometimes f) never g) always

1. a) T b) T c) T d) T e) T f) F g) F

h) T

1. C, B, E, D, A
2. 2.8 + 4.1 ≠ 5
3. You cannot add numbers under separate square root signs.

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| **1.2: Prime Numbers and Their Applications** |

1. C, P, P, C, P, C, C, C, P, C, P
2. a) 1, 2, 4, 5, 10, 20 b) 2, 5 c) 2×2×5
3. a) 3×3×3×7 b) 5×137 c) 5×7×11×11 d) 2×2×3×5×7×19
4. a) 23 b) 36 c) 33
5. a) 12 b) 9 c) 45 d) 600
6. a) 210 b) 420 c) 3596

|  |
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| **1.3: Perfect Squares and Cubes** |

1. Perfect Squares: ,

Perfect Cubes: , ,

Neither: , , ,

|  |
| --- |
| **1.4: Radicals** |

1. a) 3, 42 b) 4, 36 c) 2, 17 d) 3, 5 e) 3, -85

f) 2, 32

1. 2.4495
2. a) Entire b) Mixed c) Entire d) Mixed
3. a) b) c) d) e) f)

g) h)

1. a) b) c) d) e)

f) 52 g) h) not divisible by a perfect square

1. a) b) c) d) e)

f) g) h)-10

1. a) b) c) d) e)

f) g) h)

1. D, E, C, A, B
2. 4

|  |
| --- |
| **1.5: Exponents** |

1. a) b) c) d) e)
2. a) b) c)p d) e)
3. a) b) c)27 d)1000 e)

f)16 g)- h)81 i)16 j)-64

1. a) b) c) d) e)
2. a) b) c) d) e)
3. a) b) c) d)

e) f)

1. a) b) c) d) e) f)

g) h)64

1. a) b) c)81 d) e) f)

g) h)

|  |  |  |  |
| --- | --- | --- | --- |
| 4 | 8 | 8 | 0 |

1. 9
2. a)2 b)9e c)3 d)-10 e)2 f)f
3. a)15 b) c)3 d)-512
4. a) b)-64
5. a) b) c) d) e) f) g)

h)4 i) j)

1. a) b) c) d)
2. a) b)5 c) d) e) f)

g) h)

1. a) b) c) d) e) f)
2. a) b) c) d) e) f)

g) h) i) j) k) l)

1. You cannot take an even root of a negative number.
2. a) b) c)
3. a) b)
4. a) b) c) d)

e) f)

1. a) b) c) d) e) f)

g) h)

1. a) b) c) d) e)
2. a) b) c)