

This problem set is not homework. Students can use this problem set as extra practice or study guide for quizzes.

1. Label each of the following statements as true or false.

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|---|--|
| a) 3 is a multiple of 3. | h) If a number n is divisible by 2 and 3, then it is also divisible by 6. |
| b) $4 < 4$ | i) If a number n is divisible by 4 and 6, then it is also divisible by 24. |
| c) $5 \geq 5$ | j) Every number divisible by 12 is also divisible by 6. |
| d) 1 is a prime number. | k) Every number divisible by 6 is also divisible by 12. |
| e) 2 is a prime number. | |
| f) 14 is a multiple of 4 or 7 is a prime number. | |
| g) 14 is a multiple of 4 and 7 is a prime number. | |

2. List all factors of each of 90.

3. Consider the given numbers. 101010, 1189 188, 35530, 1234 321, 20172017. List all numbers from the list that are divisible by: a) 3 b) 4 c) 5 d) 6

4. List the first five prime numbers.

5. Which of the given numbers are primes? 501, 737, 91, 101, 2017, 407

6. Perform the given division with remainders.

- a) $2017 \div 13$ b) $12091 \div 27$ c) $1234 \div 18$ d) $5624 \div 37$

7. Let $A = \{1, 4, 6, 8, 9\}$ and $B = \{2, 3, 4, 8, 10\}$. Label the following statements as true or false.

- a) $\emptyset \subseteq A$ b) $2 \notin B$ c) $\{1, 8\} \subseteq A$ d) $\{2, 5\} \subseteq B$ e) $A \subseteq B$

8. Find each of the following sets and if possible, present them by listing their elements.

- a) $A = \{a \in \mathbb{N} \mid a < 6\}$ c) $C = \{c \in \mathbb{N} \mid c < 7 \text{ or } c > 3\}$
 b) $B = \{b \in \mathbb{N} \mid b < 7 \text{ and } b > 3\}$ d) $D = \{x \in \mathbb{N} \mid x \leq 10 \text{ and } x \text{ is even}\}$

9. Let $A = \{n \in \mathbb{N} : n \text{ is divisible by } 2\}$, $B = \{n \in \mathbb{N} : n \text{ is divisible by } 6\}$. Which (if any) of the following is true?

- $A \subseteq B$ $B \subseteq A$

10. Label each of the following statements as true or false.

- | | | |
|---|---|--------------------------------------|
| a) For all sets A , $\emptyset \subseteq A$. | c) $-2 \notin \mathbb{N}$ | e) $\mathbb{Z} \subseteq \mathbb{N}$ |
| b) $-2 \in \mathbb{Z}$ | d) For all sets A , $A \subseteq A$. | f) $0 \in \mathbb{N}$ |

11. Evaluate each of the given numerical expressions.

- | | | | | | |
|---------------|-------------|-----------|----------------|-------------------|-------------------|
| a) $-2 - 3$ | e) $(-2)^2$ | i) -2^2 | m) $3^2 - 7^2$ | q) $10 - 3(-8)$ | t) $(10 - 3)(-8)$ |
| b) $-2(-3)$ | f) $(-2)^3$ | j) -2^3 | n) $(3 - 7)^2$ | r) $10 - (3 - 8)$ | u) $10(-3 - 8)$ |
| c) $-(2 - 3)$ | g) $(-2)^4$ | k) -2^4 | o) $3^2 + 7^2$ | s) $10(-3 - 8)$ | |
| d) $(-2) - 3$ | h) $(-2)^5$ | l) -2^5 | p) $(3 + 7)^2$ | | |

12. Evaluate each of the given numerical expressions.

- a) $\sqrt{5 + \sqrt{10 - 2(-3)}}$ b) $2\sqrt{9} - 3\sqrt{25}$ c) $2^{\sqrt{9}}$ d) $\sqrt{\sqrt{\sqrt{\sqrt{100} + 6} + 5} + 1}$

13. Evaluate each of the given numerical expressions.

- | | | | | | |
|-------------|----------------|----------------|----------------|-------------------|-------------------|
| a) $(-2)^2$ | e) $5(-2)^2$ | i) $2^2 + 5^2$ | m) $(2 - 5)^2$ | q) $(2^2 - 5)^2$ | u) $(2 - (-5)^2)$ |
| b) -2^2 | f) $5 - 2^2$ | j) $(2 + 5)^2$ | n) $(2 - 5^2)$ | r) $2^2 - (-5)^2$ | v) $2^2(-(-5)^2)$ |
| c) (-2^2) | g) $5(-2^2)$ | k) $(2 + 5^2)$ | o) $2^2(-5)^2$ | s) $2^2 - (-5^2)$ | w) $2^2(-(-5)^2)$ |
| d) $-(2)^2$ | h) $5 - (2)^2$ | l) $2^2 - 5^2$ | p) $2^2(-5^2)$ | t) $(2 - (-5))^2$ | x) $2^2(-(-5))^2$ |

14. Simplify each of the following expressions by applying the order of operations agreement. **Show all steps. Perform only one operation in each step.**

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|---|---|------------------------------------|
| a) $7 \cdot 3^2 - (3 - 2^2 \cdot 5 - 1) \div 2$ | f) $\left(\left((8 - 5)^2 - 7\right)^2 - 2\right)^2 - 1$ | k) $-2^2 - 3(5 - (-2)^2) - (-1)^3$ |
| b) $\frac{5 - 1 + 2}{-1^2 + (-1)^2}$ | g) $\frac{4^2 + 5^2 - 6 \div 2 \cdot 3}{4^2 - 8 \cdot 2}$ | l) $-2 - 5(-3^2 - 2(-7))$ |
| c) $\frac{(-2)^3 - 5(-3) - (-1)^4 + (-3)^2}{-2^2 - (-1)}$ | h) $3 + 2(5 + 3(15 - 2^3) - 2^2 - 1)$ | m) $ -10 - 7 - 1 - 4 $ |
| d) $ 3 - 8 - (3 - 8)$ | i) $4(3(2(2^2 - 1) - 1) - 1) + 5$ | n) $ -10 - 7 - 1 - 4 $ |
| e) $2^3 - 2(5 - (-3)^2)^2$ | j) $-3^2 - (-24) \div (5 - (-1)^3) \cdot 2$ | o) $ -10 - 7 1 - 4 $ |
| | | p) $ -10 - 7 - 1 - 4 $ |
| | | q) $ -10 -7 - 1 - 4 $ |

15. Compute $\frac{3}{7}$ of 35. b) Compute 40% of 5000.

16. A living room furniture set originally cost \$1200. What will be the sale price if the furniture set goes on a 15% off sale?

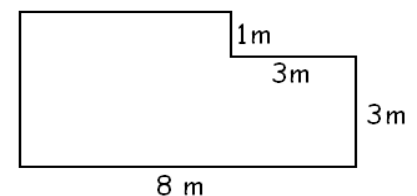
17. Consider the fractions $\frac{3}{5}$ and $\frac{5}{8}$.

- a) Compute $\frac{3}{5}$ of 80 and $\frac{5}{8}$ of 80 to compare the two fractions.
 b) Bring the two fractions to the common denominator to compare them.

18. a) We placed \$2000 dollars in a bank account with a simple annual interest rate of 3%. This means that after one year, the bank will pay us 3% of the amount we kept in the account for a year. How much money is in the account after we received the 3% interest?

b) Compute 103% of 2000. Can you explain the connection between your results for a) and b)?

19. Compute the perimeter and area of the figure shown. Include units in your computation and answer.



20. (Enrichment) Two mathematicians are having a conversation. Mathematician A asks B about his kids. B answers: "I have three children, the product of their ages is 36." A says: "I still don't know how old your children are." Then B tells A the sum of his three kids' ages. A answers: "I still don't know how old they are. Then B adds: "The youngest one has red hair." Now A knows how old the kids are. Do you?

Answers

1. a) true b) false c) true d) false e) true f) true g) false h) true i) false j) true k) false
2. 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90 3. a) 101010, 1189 188 b) 1189 188, c) 101010, 35530 d) 1189 188
4. 2, 3, 5, 7, 11 5. 101 and 2017 6. a) 155 R 2 b) 447 R 22 c) 68 R 10 d) 152
7. a) true b) false c) true d) false e) false
8. a) $\{1, 2, 3, 4, 5\}$ b) $\{4, 5, 6\}$ c) \mathbb{N} (all natural numbers) d) $\{2, 4, 6, 8, 10\}$ 9. $B \subseteq A$
10. a) true b) true c) true d) true e) false f) false
11. a) -5 b) 6 c) 1 d) -5 e) 4 f) -8 g) 16 h) -32 i) -4 j) -8 k) -16
l) -32 m) -40 n) 16 o) 58 p) 100 q) 34 r) 15 s) -110 t) -56 u) 50
12. a) 3 b) -9 c) 8 d) 2
13. a) 4 b) -4 c) -4 d) -4 e) 20 f) 1 g) -20 h) 1 i) 29 j) 49 k) 27 l) -21 m) 9
n) -23 o) 100 p) -100 q) 1 r) -21 s) 29 t) 49 u) -23 v) 100 w) -100 x) 100
14. a) 72 b) undefined c) 5 d) 10 e) -24 f) 3 g) undefined h) 45 i) 61 j) -1 k) -6 l) -27
m) 14 n) 20 o) 31 p) 12 q) 120 15. a) 15 b) 2000 16. \$1020
17. a) $\frac{3}{5}$ of 80 is 48 and $\frac{5}{8}$ of 80 is 50. Since $48 < 50$, we also have that $\frac{3}{5} < \frac{5}{8}$
b) $\frac{3}{5} = \frac{24}{40}$ and $\frac{5}{8} = \frac{25}{40}$ Thus $\frac{3}{5} = \frac{24}{40} < \frac{25}{40} = \frac{5}{8}$
18. a) \$2060 b) \$2060 This is not a coincidence. If we take 103% of a quantity, that is the same as taking 3% of it and adding to the quantity itself.
19. $P = 24 \text{ m}$, $A = 29 \text{ m}^2$