

[Course](#) > [Week 3...](#) > [3.17 Pr...](#) > [Proble...](#)

Problem Set 3

1

0.0/1.0 point (graded)

How many positive divisors does 2016 have?

Hint: $2016 = 2^5 \cdot 3^2 \cdot 7$

Answer: 36

Explanation

Any positive divisor of 2016 can be factored as $2^x \cdot 3^y \cdot 7^z$, in which $x \in \{0, 1, \dots, 5\}$, $y \in \{0, 1, 2\}$ and $z \in \{0, 1\}$. By the product rule, there are $6 \times 3 \times 2 = 36$ divisors.

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You have used 0 of 4 attempts

i Answers are displayed within the problem

2

0.0/2.0 points (graded)

Given a finite set A and an infinite set B , which of the following sets are finite?

☒ $A \cap B$ ✓

☐ $A \cup B$

☒ $A - B$ ✓

☐ $B - A$

☐ $A \Delta B$

☐ $A \times B$

You have used 0 of 4 attempts

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3

0.0/3.0 points (graded)

Of 100 foreign journalists who can speak Chinese, English or French at a press conference:

60 speak Chinese.

65 speak English.

60 speak French.

35 speak both Chinese and English.

25 speak both Chinese and French.

35 speak both English and French.

How many journalists speak **exactly**

- one language,

Answer: 25

- two languages,

Answer: 65

- three languages?

Answer: 10

Explanation

Apply the Principle of Inclusion and Exclusion on three sets.

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4

0.0/6.0 points (graded)

Recall that the power set $\mathcal{P}(S)$ of a set S is the collection of all subsets of S .

For $A = \{1, 2, 3\}$ and $B = \{x, y\}$, calculate the following cardinalities.

- $|\mathcal{P}(A)|$

Answer: 2^3

- $|\mathcal{P}(B)|$

Answer: 2^2

- $|A \times B^2|$

Answer: $3 \cdot 2 \cdot 2$

- $|\mathcal{P}(A \times B)|$

Answer: $2^{(3 \cdot 2)}$

- $|\mathcal{P}(A) \times B|$

Answer: $2^{3 \cdot 2}$

- $|\mathcal{P}(\mathcal{P}(A))|$

Answer: $2^{(2^3)}$

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5

0.0/3.0 points (graded)

How many anagrams, with or without meaning, do the following words have?

- CHAIR

Answer: 120

Explanation

Permutation of 5 letters.

- INDIA

Answer: 60

Explanation

There are two "I"s, so there are $\binom{5}{2,1,1,1} = 60$ anagrams.

- SWIMMING

Answer: 10080

Explanation

There are two "I"s and two "M"s, so $\binom{8}{2,2,1,1,1,1} = 10080$ anagrams.

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