FEEDBACK
Both of the above. If A and B are disjoint then either by the disjoint union rule or by inclusion exclusion, the size of the union is the sum of the sizes. That implies that if one of the sets is empty the same holds.

1

0 points possible (ungraded)
In a high school graduation exam, 80% of examinees passed the English exam, 85% passed the math exam, and 75% passed both. If 40 examinees failed both subjects, what what the total number of examinees?

| 400 |

✔ **Answer:** 400

400

Explanation
By inclusion exclusion (applied to fractions), $80 + 85 - 75 = 90$% of the students passed at least one topic. Therefore 10% failed both topics. It follows that 40 students correspond to 10%, hence 400 students took the exam.

| Submit | You have used 2 of 4 attempts |

ℹ Answers are displayed within the problem

2

0 points possible (ungraded)
How many integers in $\{1, 2, \ldots, 100\}$ do not contain the digit 6?

| 84 |

✘ **Answer:** 81

84

Explanation
Let $U_6 = \{6, 16, \ldots, 96\}$ be the sets of integers between 1 and 100 whose units digit is 6, and let $T_6 = \{60, 61, \ldots, 69\}$ be the corresponding set for the tens digit.
The set of integers between 1 and 100 containing 6 is $U_6 \cup T_6$, and by inclusion-exclusion, its size is $|U_6 \cup T_6| = |U_6| + |T_6| - |U_6 \cap T_6| = 10 + 10 - 1 = 19$
Hence 100-19=81 integers between 1 and 100 do not contain the digit 6.

| Submit | You have used 4 of 4 attempts |

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3

6.0/6.0 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,

25   ✔ **Answer:** 25

25

- two languages,

65   ✔ **Answer:** 65

65

- three languages?

10   ✔ **Answer:** 10

10

Explanation
By the Principle of Inclusion and Exclusion for three sets,
$$100 = |A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C| = 90 + |A \cap B \cap C|$$
.

Submit   You have used 1 of 4 attempts

ⓘ   Answers are displayed within the problem

4

1.0/1.0 point (graded)
$|A \cup B| = |A| + |B|$ when

☑ A and B are disjoint, ✔

☑ A is the complement of B, ✔

☑ A and B do not intersect, ✔

☑ At least one of A and B is empty. ✔

✔

Explanation
It holds whenever A and B are disjoint.

| Submit | You have used 1 of 3 attempts

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5

0 points possible (ungraded)
The following equation is incorrect. What needs to be added to make it correct?

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C|$$

○ $-|A \cap B \cap C|$

◉ $+|A \cap B \cap C|$ ✔

○ $+3|A \cap B \cap C|$

| Submit | You have used 1 of 2 attempts

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6

0 points possible (ungraded)
In a highschool graduation exam 70% of examinees passed the English exam, 76% passed the math exam, and 66% passed both. If 40 examinees failed in both subjects, what is the total number of examinees?

| 200 | ✔ **Answer: 200**

| 200 |

Explanation
By the inclusion-exclusion principle, the percentage of students who passed at least one of the two exams is 70+76-66=80. Therefore 20% have failed both subjects. Hence the total number of examinees is 40 / 20% = 200.

| Submit | You have used 2 of 4 attempts

ℹ️ Answers are displayed within the problem

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