Math 7 Unit 1 quiz 1: Adding integers, Subtracting integers (answer key)

8 questions, 18 points

ANSWERS AT A GLANCE

1. (a) −35 (b) 23 (c) −16 (d) 38
2. (a) −59 (b) 101
3. −3
4. $P = -9$ and $Q = -8$; the greater one, −8, is more by 1.
5. (a) −17 + (−5) = −22, not −12. (b) −7
6. It went up by 6 members.
7. 40 points
8. (a) Sometimes. (b) Always. (c) Never.

WORKED SOLUTIONS

1. Find each difference. (2 points)

(a) $-13 - 22$ (b) $-7 - (-30)$ (c) $45 - 61$ (d) $19 - (-19)$

ANSWER

(a) −35 (b) 23 (c) −16 (d) 38

SOLUTION

(a) −13 + (−22) = −35 (b) −7 + 30 = 23 (c) 45 + (−61) = −16 (d) 19 + 19 = 38

2. Find each sum. (a) 27 + (−86) (b) −38 + 139 (2 points)

ANSWER

(a) −59 (b) 101

SOLUTION

(a) Different signs: 86 − 27 = 59, and −86 is farther from zero, so 27 + (−86) = −59.

(b) Different signs: 139 − 38 = 101, and 139 is farther from zero, so −38 + 139 = 101.

3. Evaluate $-x + y + (-4)$ when $x = -7$ and $y = -6$. (2 points)

ANSWER

−3

SOLUTION

$-x$ is the opposite of x, and the opposite of −7 is 7. So the expression is

$$7 + (-6) + (-4)$$

The two negative numbers add: −6 + (−4) = −10. Then the signs differ: 7 + (−10) = −3.

4. Let $P = -19 - (-10)$ and $Q = 9 - 17$. Find P and Q. Which is greater, and by how much? (2 points)

ANSWER

$P = -9$ and $Q = -8$; the greater one, −8, is more by 1.

SOLUTION

Write each subtraction as adding the opposite:

$$P = -19 + 10 = -9 \qquad Q = 9 + (-17) = -8$$

The greater is −8. How much greater is a difference too: −8 − (−9) = 1.

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5. Jack says that −12 − (−5) = −17. (3 points)

(a) Use the meaning of subtraction (add the answer back to the number subtracted) to show that Jack is wrong.

(b) Find the correct difference, and check it the same way.

ANSWER

(a) −17 + (−5) = −22, not −12. (b) −7

SOLUTION

(a) If −17 were the difference, then −17 + (−5) would give back −12. But −17 + (−5) = −22, so Jack is wrong. (He added −5 instead of subtracting it.)

(b) Subtracting −5 is adding 5: −12 − (−5) = −12 + 5 = −7. Check: −7 + (−5) = −12, the first number.

SCORING

1 point: (a) adds Jack's answer to −5 and shows the result is not −12. 1 point: (b) the difference −7, found by adding the opposite. 1 point: (b) the check −7 + (−5) = −12.

6. The number of members in a chess club changes from month to month. In January it went up by 4 members. In February it went down by 12 members, and in April it went down by 3 members. From the start of January to the end of April it went down by 5 members in all. What happened to the number of members in March? (2 points)

ANSWER

It went up by 6 members.

SOLUTION

Write each change as an integer, a rise positive and a fall negative, with m for March's change:

$$4 + (-12) + m + (-3) = -5$$

The three known changes add to 4 + (−12) + (−3) = −11. So $-11 + m = -5$: m is the move from −11 to −5 on the number line, which is 6 to the right.

The club went up by 6 members in March. Check: −11 + 6 = −5.

7. In a school quiz contest, a team gains points for each right answer and loses points for each wrong one, so its score can fall below zero. After the first round, Ethan's team had −10 points. After the second round, the team's total for both rounds was 30 points. How many points did the team score in the second round alone? (2 points)

ANSWER

40 points

SOLUTION

Let s be the second-round score. The first round plus the second gives the total: $-10 + s = 30$. So s is the number that, added to −10, gives 30:

$$s = 30 - (-10) = 30 + 10 = 40$$

Check: −10 + 40 = 30.

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8. The integer a is negative and the integer b is positive. Decide whether each statement is always true, sometimes true or never true, and explain. For "sometimes", give one example where it is true and one where it is false. (3 points)

(a) $a + b$ is negative.

(b) $a + b$ is greater than a and less than b.

(c) $|a + b| = |a| + |b|$

ANSWER

(a) Sometimes. (b) Always. (c) Never.

SOLUTION

(a) Sometimes. The signs differ, so the sum takes the sign of the number farther from zero. When a is farther from zero the sum is negative: $-5 + 2 = -3$. When b is farther from zero it is positive: $-2 + 5 = 3$.

(b) Always. Start at a and make the move b: b is positive, so the move is to the right and $a + b > a$. In the other order, $a + b = b + a$: start at b and make the move a, which is to the left, so $a + b < b$. For example, $-6 + 4 = -2$, and $-6 < -2 < 4$.

(c) Never. With different signs, the size of the sum is the larger absolute value minus the smaller. Neither number is 0, so the smaller absolute value is at least 1, and the larger minus the smaller is less than the larger plus the smaller. For example, $|-6 + 4| = 2$, but $|-6| + |4| = 10$.

SCORING

1 point for each part: the right verdict with a valid reason. (a) needs one example of each kind; (b) needs both comparisons; (c) needs that the size of the sum is the difference of the absolute values, not their sum.

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