

IBEW aptitude test: free printable sample

Ten algebra questions from our free full-length practice test, with a worked solution for each one at the back.

How to use it. Work each question on paper, without a calculator: on the test, calculators are not allowed. On the official test, the Algebra and Functions part gives you 46 minutes for 33 questions, a little under a minute and a half each, so give yourself about 14 minutes for these ten. Then check your answers and read the solution to every question you missed.

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Questions

- 1 The distance around a rectangular room is $P = 2L + 2W$, where L is the length and W is the width. How many feet of trim go around a room that is 24 feet long and 14 feet wide?

A 62	B 38
C 336	D 76
- 2 Which expression is equivalent to $9x + 3 + 8x + 1$?

A $17x + 4$	B $21x$
C $17x + 2$	D $x + 4$
- 3 Consider the formula $V = 3n - 12$. Which of the following statements is true for this formula?

A When the value of n is less than 4, V is positive.	B When the value of n is greater than 4, V is negative.
C When the value of n is less than 12, V is negative.	D When the value of n is less than 4, V is negative.
- 4 Consider the following pattern of numbers: 78, 85, 76, 83, 74, 81. What is the next number in the pattern?

A 70	B 79
C 72	D 88
- 5 Solve for x : $6(x + 6) = 90$. What is the value of x ?

A 21	B 14
C 9	D 84

- 6 Consider the table of x and y values. One y value is missing and shown as ?. What number belongs there?

x	y
1	4
2	9
3	14
4	19
5	?

- A 24
B 5
C 29
D 26
- 7 Consider the formula $V = LWH$. Which of these is the same formula solved for H ?
A $H = VLW$
B $H = LW/V$
C $H = V/L - W$
D $H = V/(LW)$
- 8 An apprentice earns \$28 an hour. After a 10% raise, what is the new hourly pay?
A \$25.20
B \$30.80
C \$38
D \$2.80
- 9 Which gives all the values of x for which $2x^2 + x - 3 = 0$?
A $x = -1$ or $x = 3/2$
B $x = -3$ or $x = 1$
C $x = -3/2$ or $x = 1$
D $x = -3/2$ or $x = -1$
- 10 What is the slope of the line that passes through the points $(-5, -7)$ and $(1, -3)$?
A $3/2$
B $-2/3$
C $2/3$
D $5/2$

Answers and worked solutions

Answer key

1 D	2 A	3 D	4 C	5 C	6 A	7 D	8 B	9 C	10 C
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Worked solutions

1 **D. 76** Evaluating formulas

The distance around a rectangular room is $P = 2L + 2W$, where L is the length and W is the width. How many feet of trim go around a room that is 24 feet long and 14 feet wide?

1. Put in the numbers: $P = 2 \times 24 + 2 \times 14$.
2. Multiply first: $2 \times 24 = 48$ and $2 \times 14 = 28$. Then add: $48 + 28 = 76$.
3. $24 + 14 = 38$ covers only two of the four walls.
4. So the answer is 76.

Why the others are wrong

- A.** This doubles the length but not the width.
- B.** This adds one length and one width, which covers only two of the four walls.
- C.** This multiplies length by width, which gives the floor area, not the distance around.

2 **A. $17x + 4$** Equivalent expressions

Which expression is equivalent to $9x + 3 + 8x + 1$?

1. Group the x terms and the plain numbers: $9x$ and $8x$; 3 and 1.
2. x terms: $9 + 8 = 17$, so $17x$. Numbers: $3 + 1 = 4$.
3. x terms and plain numbers are unlike terms: they cannot be added together.
4. So the answer is $17x + 4$.

Why the others are wrong

- B.** This adds the plain numbers into the x term. Numbers and x terms cannot be combined.
- C.** The numbers are combined wrongly: $3 + 1 = 4$, not 2.
- D.** The x terms are combined wrongly: $9 + 8 = 17$, not 1.

3 **D. When the value of n is less than 4, V is negative.** Sign of a formula's output

Consider the formula $V = 3n - 12$. Which of the following statements is true for this formula?

1. Find where V is exactly 0: $3n - 12 = 0$ when $n = 4$. Check: $3 \times 4 - 12 = 0$.
2. The number in front of n is 3, which is positive, so V goes up as n gets bigger.
3. So V is negative when n is less than 4, and positive when n is greater than 4. Test one value: $n = 6$ gives $V = 6$.
4. The sign changes where $V = 0$, which is at $n = 4$, not at any other number in the formula.
5. So the true statement is: When the value of n is less than 4, V is negative.

Why the others are wrong

- A.** This has the sign the wrong way round. Try $n = 0$: $V = -12$, which is negative.
- B.** This points the wrong way from 4. Try $n = 5$: $V = 3$, which is positive.
- C.** The sign changes at $n = 4$, where V is 0, not at 12. Try $n = 5$: $V = 3$, which is positive.

4 C. 72 Number patterns

Consider the following pattern of numbers: 78, 85, 76, 83, 74, 81. What is the next number in the pattern?

1. Find the change from each number to the next: +7, -9, +7, -9, +7.
2. The changes take turns: +7, then -9. The last change was +7, so the next one is -9.
3. $81 - 9 = 72$.
4. Using +7 again repeats the last change; the changes take turns.
5. So the answer is 72.

Why the others are wrong

- A.** This goes three steps on.
- B.** This goes two steps on.
- D.** This uses +7 again. The changes take turns, so the next one is -9.

5 C. 9 Solving equations

Solve for x : $6(x + 6) = 90$. What is the value of x ?

1. Divide both sides by 6: $x + 6 = 90 \div 6 = 15$.
2. Subtract 6: $x = 15 - 6 = 9$.
3. If you multiply out first, the 6 multiplies both x and 6: $6x + 36 = 90$.
4. So the answer is 9.

Why the others are wrong

- A.** After dividing by 6, this adds 6 instead of subtracting it.
- B.** This reads $6(x + 6)$ as $6x + 6$. The 6 multiplies the 6 too.
- D.** This never divides by 6: it solves $x + 6 = 90$.

6 A. 24 Matching tables to relationships

Consider the table of x and y values. One y value is missing and shown as ?. What number belongs there?

1. Find the rule from two full rows: y changes by 5 when x goes up by 1. Start from $5x$. At $x = 1$, $5x$ is 5 but y is 4, so subtract 1: $y = 5x - 1$.
2. Check a row: $x = 2$ gives $10 - 1 = 9$, as in the table.
3. For $x = 5$: $5 \times 5 - 1 = 24$.
4. So the answer is 24.

Why the others are wrong

- B.** This is the x value, not the y value.
- C.** This adds the change twice, but x goes up by only one here.
- D.** This adds 1 instead of subtracting it.

7 D. $H = V/(LW)$ Evaluating formulas

Consider the formula $V = LWH$. Which of these is the same formula solved for H ?

1. H is multiplied by L and by W , so divide both sides by LW .
2. $V/(LW) = LWH/(LW)$, which leaves $V/(LW) = H$.
3. Turning the fraction upside down is a common slip; check it by putting the answer back into the formula.
4. So the answer is $H = V/(LW)$.

Why the others are wrong

- A.** This multiplies where it should divide. To undo a multiplication, divide both sides.
- B.** This is the answer turned upside down.
- C.** This divides by L but subtracts W . Both L and W multiply H , so divide by both.

8 B. \$30.80 Word problems

An apprentice earns \$28 an hour. After a 10% raise, what is the new hourly pay?

1. Work out the raise: 10% of \$28 = \$2.80.
2. Add it on: \$28 + \$2.80 = \$30.80.
3. \$2.80 is the raise itself; the new pay is the old pay plus the raise.
4. So the answer is \$30.80.

Why the others are wrong

- A.** This takes the raise off instead of adding it.
C. This adds 10 dollars. The raise is 10% of \$28, which is \$2.80.
D. This is the raise itself. The new pay is the old pay plus the raise.

9 C. $x = -3/2$ or $x = 1$ Quadratics and parabolas

Which gives all the values of x for which $2x^2 + x - 3 = 0$?

1. The expression factors as $(2x + 3)(x - 1)$. Multiply it out to check.
2. $2x + 3 = 0$ gives $2x = -3$, so $x = -3/2$.
3. $x - 1 = 0$ gives $x = 1$.
4. $2x + 3 = 0$ gives $2x = -3$; you still divide by 2.
5. So the answer is $x = -3/2$ or $x = 1$.

Why the others are wrong

- A.** Both roots have the wrong sign. Check $x = -1$: $2x^2 + x - 3$ comes to -2 , not 0.
B. This stops at $2x = -3$. Divide by 2: $x = -3/2$. Check $x = -3$: $2x^2 + x - 3$ comes to 12, not 0.
D. One root has the wrong sign: $x - 1 = 0$ gives $x = 1$. Check $x = -1$: $2x^2 + x - 3$ comes to -2 , not 0.

10 C. 2/3 Reading graphs

What is the slope of the line that passes through the points $(-5, -7)$ and $(1, -3)$?

1. Slope = (change in y) $\div$ (change in x), taking both changes in the same order.
2. Change in y : $-3 - (-7) = 4$. Change in x : $1 - (-5) = 6$.
3. Slope = $4 \div 6 = 2/3$.
4. The change in y goes on top. Putting the change in x on top gives the flipped fraction.
5. So the answer is $2/3$.

Why the others are wrong

- A.** This is the change in x over the change in y . Put the change in y on top.
B. This subtracts in a different order on top and bottom, which flips the sign.
D. This adds the coordinates. Slope uses the differences.

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