Alg Test Prep - part 1

Algebra Placement Test (needs for degree program)

The Algebra Placement Test is composed of items from three curricular areas: elementary algebra, coordinate geometry, and intermediate algebra. Each of these three areas is further subdivided into a number of more specific content areas. Overall, the Algebra Placement Test includes items from more than 20 content areas;

however, the majority of test questions fall within the following 8 content areas:

1.Substituting Values into Algebraic Expressions

2.Setting Up Equations for Given Situations

3.Basic Operations with Polynomials

4.Factoring Polynomials

5.Linear Equations in One Variable

6. Exponents and Radicals

7. Rational Expressions

8.Linear Equations in Two Variables

Substituting Values into Alg. Expressions
Slides 4 - 8

Evaluate the expression: $4x^3 - 2xy - y^2$ when $x = -2$, $y = -1$

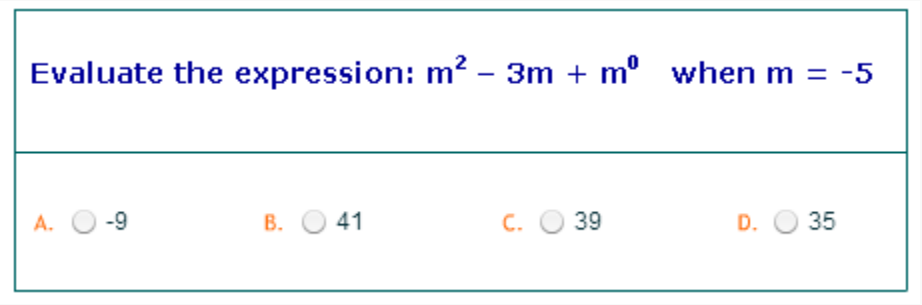
A. -29 B. -37

Ans:

Substitute $x = -2$ and $y = -1$

$$\begin{aligned} 4x^3 - 2xy - y^2 &= 4(-2)^3 - 2(-2)(-1) - (-1)^2 \\ &= 4(-8) - 2(-2)(-1) - (+1) \\ &= -32 - 4 - 1 \\ &= -37 \end{aligned}$$

2.



Ans:

Substitute m = 5

$m^2 - 3m + m^0 = (-5)^2 - 3(-5) + (-5)^0$

$= (25) + 15 + 1$ Recall that: $a^0 = 1\ (a \neq 0)$

$= 40 + 1$

$= 41$

REMEMBER:

ANY Number to the power of 0 is 1

(Except 0)

3.

The area of a circle is given by the formula: $A = \pi r^2$
If the area of a circle is 169π square inches, then find the radius r.

A. ○ 169 inches
B. ○ 13π inches
C. ○ +/- 13 inches
D. ○ 13 inches

Ans.

Solve for r.

Step #1: Substitute the values for A into the given formula.

$$A = \pi r^2$$
$$169\pi = \pi r^2$$

Step #2: Solve for r^2

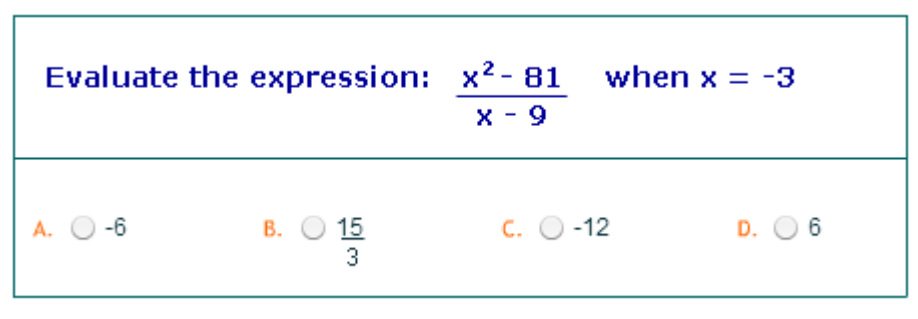
$$\frac{169\pi}{\pi} = r^2$$
$$169 = r^2$$

Step#3: Solve for r (Since the radius r is a distance measurement it is always greater than or equal to zero)

$$\sqrt{169} = r^2$$
$$13 = r$$

Thus, the radius is 13 inches.

4.



HINT:
Think neg/neg so answer must be either B or D.

$$\frac{(-3)^2 - 81}{(-3) - 9} \quad \frac{9 - 81}{-12} = \frac{-72}{-12}$$

$$= 6$$

5.

Let C represents the temperature in degrees Celsius and F the temperature in degrees Fahrenheit, the formula to convert from C to F is: $F = \frac{9}{5}C + 32$ Find the temperature in degree Celsius If the degree Fahrenheit is 45. Round to the nearest degree if necessary.

A. 26° B. 113° C. 7.2° D. 7°

Hint: Once you substitute in for F, then undo +- first.

Careful, “to the nearest degree”!

Information:

- $F = \frac{9}{5}C + 32$
- $F = 45°$

Substitute $F = 45°$ into $F = \frac{9}{5}C + 32$

$45 = \frac{9}{5}C + 32$ Subtract 32 from both sides

$-32 \qquad -32$

$13 = \frac{9}{5}C$ multiply both sides by the reciprocal of nine fifths

Ans: D

Setting Up Equations: Slides 9 - 12

1.

If r is the sum of three fourths of t and 5% of s then which of the following correctly expresses the relationship between r, s and t?

A. $r = \frac{3}{4}t + 5s$

B. $r = \frac{3}{4}t + 0.05s$

C. $r = \frac{3}{4}(t + 0.05s)$

D. $r = \frac{3}{4}t + 0.5s$

HINT
IS =
Sum of ( )
How do you represent % as a decimal?

- The fractional representation of three fourths of t is $\frac{3}{4}t$
- The correct decimal representation of 5% of s is 0.05s

We next represent r as the sum of three fourths of t is $\frac{3}{4}t$ and 5% of s

$r = \frac{3}{4}t + 0.05s$

2.

Which of following correctly expresses the relationship that three less than the reciprocal of a number x is two more than the reciprocal of twice x?

A. $x - 3 = 2x + 2$

B. $\frac{1}{x} - 3 = 2\left[\frac{1}{x}\right] + 2$

C. $3 - \frac{1}{x} = \frac{1}{2x} + 2$

D. $\frac{1}{x} - 3 = \frac{1}{2x} + 2$

HINT:
"3 Less than" is written differently.
Try one you know: 4 less than 6 is 2. 6-4=2

IS means =

- 'the reciprocal of x' translates into: $\frac{1}{x}$
- '3 less than a quantity n' translates into: n - 3

Therefore the left side of this equation is: $\frac{1}{x} - 3$

- 'the reciprocal of twice x' translates into: $\frac{1}{2x}$
- '2 more than a quantity n' translates into: n + 2

Therefore the right side of this equation is: $\frac{1}{2x} + 2$

Therefore the equation is: $\frac{1}{x} - 3 = \frac{1}{2x} + 2$

3.

Two joggers Sue and Jessica began their morning exercise at the same time. Sue jogs at x feet per minute (ft/min) for 10 minutes. Jessica jogs the same distance but at a rate of 6 ft/min faster, only taking 8 minutes. Which of the following can be used to find the rate Sue was jogging?

A. $10x = 8(x + 6)$

B. $10x = 8x + 6$

C. $x + x + 6 = 18$

D. $10x + 8x = 6$

KNOW THIS FORMULA: D= R x T (distance = rate * time)

S distance = x * 10
J distance = (x + 6) * 8

Because same distance X*10 = (x+6)*8
Commutative property: 10x = 8 (x + 6)

4.

Maria typed for 20 minutes at x words per minute (wpm) and 40 minutes at 48 wpm. If her average rate was 50 wpm which of the following equations can be used to solve for x?

A. $\frac{x + 48(40)}{60} = 50$

B. $\frac{20x + 48(40)}{2} = 50$

C. $\frac{20x + 48(40)}{60} = 50$

D. $20x + 48(40) = 50$

First, we form an equation: $50 \text{ wpm} = \frac{\text{total number of words}}{60}$

Then, we find the total number of words Maria typed.

Total number = words typed in 20 minutes + words typed in 40 minutes

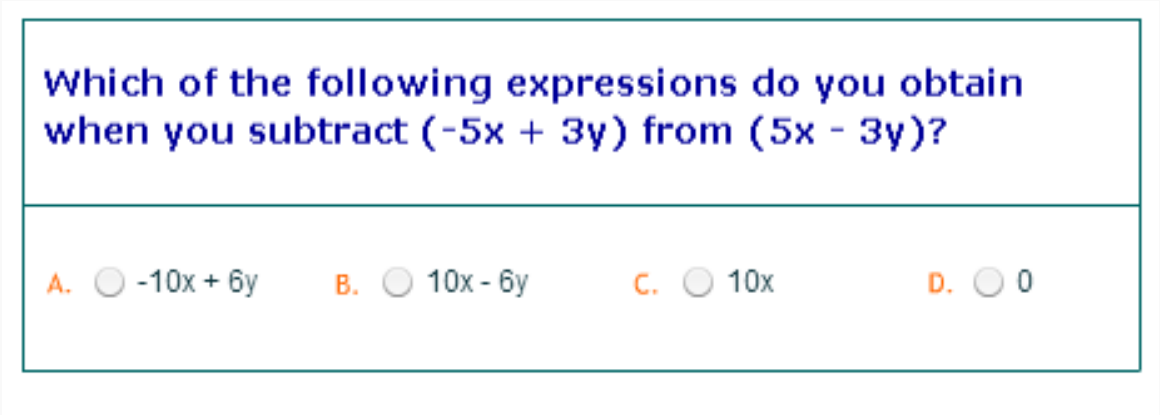
Total words: 20 x + 48(40)

Avg means divide by total of 60 and the answer is 50 so…

C.

Basic Operations with Polynomials: 13 - 17

1.



HINT:
"Subtract from" is an opposite.
Always REWRITE - DON'T do in your head!

Distribute the negative to the second expression:

$$(5x - 3y) - (-5x + 3y) = (5x - 3y) + (5x - 3y)$$
$$= 5x - 3y + 5x - 3y$$
$$= 10x - 6y$$

2.

Find the sum of $\frac{1}{2}m^2n + \frac{1}{4}m^2n^2$ and $-mn^2 + m^2n^2$

A. $\frac{1}{2}m^2n - mn^2 + \frac{5}{4}m^4n^4$

B. $1.5m^7n^7$

C. $\frac{1}{2}m^2n - mn^2 + \frac{5}{4}m^2n^2$

D. $-0.5m^2n + 1.25m^2n^2$

HINT 1: Can only add / sub coefficients of LIKE TERMS

That means exponents must be to the same power.

HINT 2: A and C are only options

because first and third terms must stay same in original expression. WHY?

C is correct. REMEMBER when you + and - coefficients of like terms the exponents stay the same!

3.

Which of the following is equivalent to:
$5(a - 5b) - 3(-6a + b)$

A. 23a - 28b

C. 23a + 28b

B. -13a - 22b

D. 23a - 22b

HINT: Careful with distributive property!

Distribute to BOTH in parenthesis

$= 5a - 25b + 18a - 3b$
$= 23a - 28b$

4.

Which of the following expressions is equivalent to: $(x - y)^2 - (y^2 - x^2)$?

A. $-2xy$

B. $2x^2$

C. $2x\,(x - y)$

D. $2x^2 - 2xy - 2y^2$

THINK:
How do you square a binomial?

FOIL (first, outside, inside, last)

(x-y)(x-y) = x^2 - 2xy + y^2

$$(x - y)^2 - (y^2 - x^2) = x^2 - 2xy + y^2 - (y^2 - x^2)$$
$$= x^2 - 2xy + y^2 - y^2 + x^2$$
$$= 2x^2 - 2xy$$
$$= 2x\,(x - y)$$

Don't forget to distribute the negative over (y^2 - x^2)

5.

Which of the following is equivalent to the expression $4s^2t - 3s^2t(t - 1)$?

A. $s^2t(t - 1)$

B. $s^2t - 3s^2t^2$

C. $4s^2t$

D. $s^2t(7 - 3t)$

HINT:
Go slowly and get the point!

$$\begin{aligned} 4s^2t - 3s^2t(t - 1) &= 4s^2t - 3s^2t^2 + 3s^2t \\ &= 7s^2t - 3s^2t^2 \\ &= s^2t(7 - 3t) \end{aligned}$$

In last step, they simplified by pulling out like term of s^2t from both terms. Check by distributing.

Factoring Polynomials: slides 18 -23

Factors of 12:.

1,12, 2,6, 3, 4 = 12 can be divided by them. To check we multiply: 1 x 12 check.

2 x 6 check, 3 x 4 check. The same happens with polynomials:

Which of the following is a factor of: $x^2 - 3x - 28$?

A. ○ $x - 2$

C. ○ $x - 4$

B. ○ $x + 7$

D. ○ $x - 7$

Since the coefficient of x^2 is one, to factor: $x^2 - 3x - 28$ we look for two factors of -28 whose sum is -3. The only such factors are -7 & 4.

Therefore $x^2 - 3x - 28 = (x - 7)(x + 4)$

X -28 + -3

1	28	28	27 or 29
2	14	28	12 or 16
4	7	28	3 or 11
4	-7	-28	-3

2.

Factor completely: $4x^5y^5z - 18x^3y^7z - x^3y^5z$

A. $2x^3y^5z\,(2x^2 - 9y^2)$

B. $2x^3y^5z\,(2x^2 - 9y^2 + \frac{1}{2})$

C. $xyz(4x^4y^4 - 18x^2y^6 - x^2y^4)$

D. $x^3y^5z\,(4x^2 - 18y^2 - 1)$

HINT:
Can you eliminate 2 quickly looking at coefficients?

To factor completely the expression: $4x^5y^5z - 18x^3y^7z - x^3y^5z$ we look for the greatest common factor (GCF) of all three terms.

GCF = x^3y^5z

Therefore: $4x^5y^5z - 18x^3y^7z - x^3y^5z = x^3y^5z(4x^2 - 18y^2 - 1)$

A and B should be eliminated.

2 cannot be pulled out of the third term.

Underline the GCFs as you go.

3.

Which of the following is a factorization of: $9x^2 - 256$?

A. $(3x - 16)(3x + 16)$

B. $(9x + 16)(9x - 16)$

C. $(3x + 32)(3x - 8)$

D. $(3x - 4)(3x + 4)$

HINT:

Perfect squares will have only 2 terms. What cancels middle term?

Check with FOIL

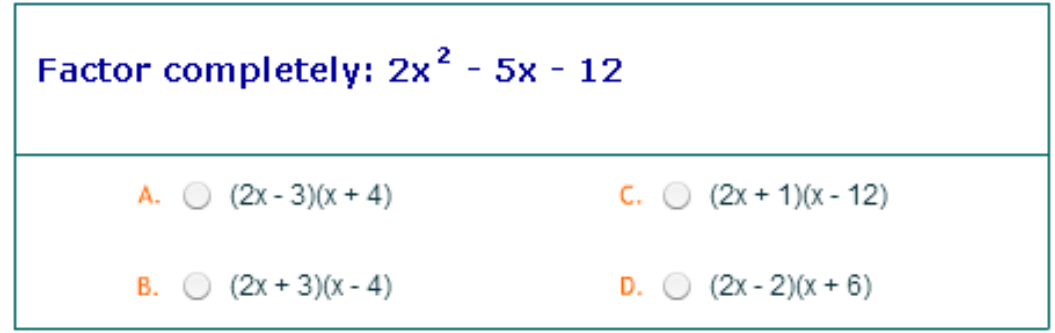
Because this term is the difference of two perfect squares we can factor this expression using: $a^2 - b^2 = (a + b)(a - b)$

Therefore: $9x^2 - 256 = 9x^2 - 16^2$

$= (3x - 16)(3x + 16)$

If it is easier, start with answers and FOIL them for the correct answer.

4.

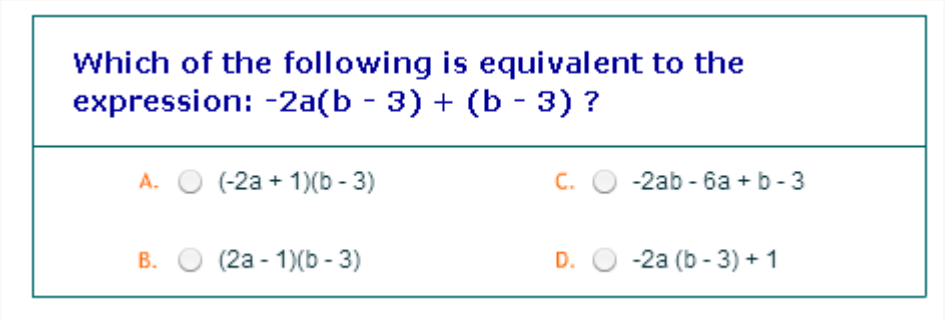


HINT:

Use FOIL to check
from the answers!

ANS. B

5.



HINT 1:

What jumps out at you that can be factored?

HINT 2:

Remember that there is a 1 in front of (b-3).

-2a (b - 3) + 1(b - 3)

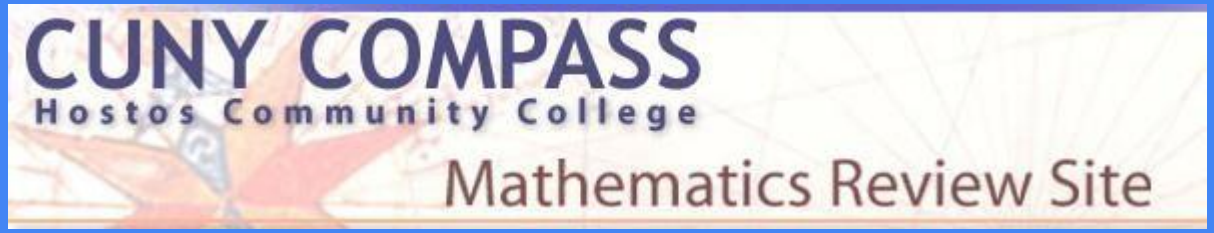
We can factor -2a(b - 3) + (b - 3) by treating (b - 3) as a common factor.

-2a(b - 3) + (b - 3) = (-2a + 1)(b -3)

End of Part 1.

What area(s) do you need to practice?

Made with explanations using



http://www.hostos.cuny.edu/oaa/compass/index.asp

Go here for more practice:

http://www.highlands.edu/site/tutorial-center-compass-test-practice