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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>A.</td>
<td>-29</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>-37</td>
<td></td>
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</tbody>
</table>

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

$4x^3 - 2xy - y^2 = 4(-2)^3 - 2(-2)(-1) - (-1)^2$

$= 4(-8) - 2(-2)(1) - 1$

$= -32 - 4 - 1$

$= -37$

Ans:
Evaluate the expression: $m^2 - 3m + m^0$ when $m = -5$

<table>
<thead>
<tr>
<th></th>
<th>A. -9</th>
<th>B. 41</th>
<th>C. 39</th>
<th>D. 35</th>
</tr>
</thead>
</table>

**Ans:**

Substitute $m = 5$

\[
m^2 - 3m + m^0 = (-5)^2 - 3(-5) + (-5)^0 \\
= 25 + 15 + 1 \quad \text{Recall that: } a^0 = 1 \quad (a \neq 0) \\
= 40 + 1 \\
= 41
\]

**REMEMBER:**

ANY Number to the power of 0 is 1

(Except 0)
The area of a circle is given by the formula: \( A = \pi r^2 \)
If the area of a circle is 169 \( \pi \) square inches, then find the radius \( r \).

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<tbody>
<tr>
<td>A</td>
<td>169 inches</td>
<td>C</td>
</tr>
<tr>
<td>B</td>
<td>13( \pi ) inches</td>
<td>D</td>
</tr>
</tbody>
</table>

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.
Evaluate the expression: \( \frac{x^2 - 81}{x - 9} \) when \( x = -3 \)

|   | A. -6 | B. \( \frac{15}{3} \) | C. -12 | D. 6 |

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

\[
\begin{align*}
(-3)^2 - 81 &= 9 - 81 = -72 \\
9 - 81 &= -72 \quad \text{or} \\
(-3) - 9 &= -12 - 9 = -12 \\
-12 &= -12 \\
\end{align*}
\]

\[= 6\]
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.

<p>| | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A.</td>
<td>26°</td>
<td>B.</td>
<td>113°</td>
</tr>
<tr>
<td>C.</td>
<td>7.2°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>7°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Information:**
- \( F = \frac{9}{5}C + 32 \)
- \( F = 45^\circ \)

Substitute \( F = 45^\circ \) into \( F = \frac{9}{5}C + 32 \)

\[
\begin{align*}
45 &= \frac{9}{5}C + 32 \\
-32 &= -32 \\
13 &= \frac{9}{5}C
\end{align*}
\]

Multiply both sides by the reciprocal of nine fifths

**Ans:** D

---

**Hint:** Once you substitute in for \( F \), then undo + - first.

**Careful, “to the nearest degree”!**
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 \( t \)?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A.</td>
<td>( r = \frac{3}{4}t + 5s )</td>
</tr>
<tr>
<td>B.</td>
<td>( r = \frac{3}{4}t + 0.05s )</td>
</tr>
<tr>
<td>C.</td>
<td>( r = \frac{3}{4}(t + 0.05s) )</td>
</tr>
<tr>
<td>D.</td>
<td>( r = \frac{3}{4}t + 0.5s )</td>
</tr>
</tbody>
</table>

**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 \( t \) and 5\% of \( s \)

\[
r = \frac{3}{4}t + 0.05s
\]
Which of the following correctly expresses the relationship that three less than the reciprocal of a number $x$ is two more than the reciprocal of twice $x$?

<table>
<thead>
<tr>
<th>Option</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>$x - 3 = 2x + 2$</td>
</tr>
<tr>
<td>B.</td>
<td>$\frac{1}{x} - 3 = 2 \left( \frac{1}{x} \right) + 2$</td>
</tr>
<tr>
<td>C.</td>
<td>$3 - \frac{1}{x} = \frac{1}{2x} + 2$</td>
</tr>
<tr>
<td>D.</td>
<td>$\frac{1}{x} - 3 = \frac{1}{2x} + 2$</td>
</tr>
</tbody>
</table>

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: $\frac{1}{x} - 3 = \frac{1}{2x} + 2$
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. \(10x = 8x + 6\)

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

S distance = \(x \times 10\)  
J distance = \((x + 6) \times 8\)

Because same distance  \(X \times 10 = (x+6) \times 8\)  
Commutative property: \(10x = 8(x + 6)\)
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 \( x \)?

<table>
<thead>
<tr>
<th>Option</th>
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<tbody>
<tr>
<td>A.</td>
<td>( \frac{x + 48(40)}{60} = 50 )</td>
</tr>
<tr>
<td>B.</td>
<td>( \frac{20x + 48(40)}{2} = 50 )</td>
</tr>
<tr>
<td>C.</td>
<td>( \frac{20x + 48(40)}{60} = 50 )</td>
</tr>
<tr>
<td>D.</td>
<td>( 20x + 48(40) = 50 )</td>
</tr>
</tbody>
</table>

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.

\[
\text{Total number of words} = \text{words typed in 20 minutes} + \text{words typed in 40 minutes}
\]

Total words: \( 20x + 48(40) \)

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

C.
Basic Operations with Polynomials: 13 - 17

1.

Which of the following expressions do you obtain when you subtract \(-5x + 3y\) from \(5x - 3y\)?

A. \(-10x + 6y\)  
B. \(10x - 6y\)  
C. \(10x\)  
D. \(0\)

HINT:
“Subtract from” is an opposite. Always REWRITE - DON’T do in your head!

Distribute the negative to the second expression:

\[
(5x - 3y) - (-5x + 3y) = (5x - 3y) + (5x - 3y) \\
= 5x - 3y + 5x - 3y \\
= 10x - 6y
\]
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!
HINT: Careful with distributive property!

Distribute to BOTH in parenthesis

\[
5(a - 5b) - 3(-6a + b)
\]

\[
= 5a - 25b + 18a - 3b
\]

\[
= 23a - 28b
\]
4.

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 $4s^2t - 3s^2(t - 1)$?

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<thead>
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<tbody>
<tr>
<td>A</td>
<td>$s^2(t - 1)$</td>
<td>C</td>
</tr>
<tr>
<td>B</td>
<td>$s^2t - 3s^2t^2$</td>
<td>D</td>
</tr>
</tbody>
</table>

HINT:
Go slowly and get the point!

$$4s^2t - 3s^2(t - 1) = 4s^2t - 3s^2t^2 + 3s^2t$$
$$= 7s^2t - 3s^2t^2$$
$$= s^2(t - 3t)$$

In last step, they simplified by pulling out like term of $s^2t$ from both terms. Check by distributing.
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: $x^2 - 3x - 28$?

<table>
<thead>
<tr>
<th></th>
<th>A. $x - 2$</th>
<th>B. $x + 7$</th>
<th>C. $x - 4$</th>
<th>D. $x - 7$</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>28</th>
<th>28</th>
<th>27 or 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>14</td>
<td>28</td>
<td></td>
<td>12 or 16</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>28</td>
<td></td>
<td>3 or 11</td>
</tr>
<tr>
<td>4</td>
<td>-7</td>
<td>-28</td>
<td></td>
<td>-3</td>
</tr>
</tbody>
</table>
Factor completely: $4x^5y^5z - 18x^3y^7z - x^3y^5z$

<table>
<thead>
<tr>
<th></th>
<th>Expression</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>$2x^3y^5z (2x^2 - 9y^2)$</td>
</tr>
<tr>
<td>B</td>
<td>$2x^3y^5z (2x^2 - 9y^2 + 1/2)$</td>
</tr>
<tr>
<td>C</td>
<td>$xyz(4x^4y^4 - 18x^2y^6 - x^2y^4)$</td>
</tr>
<tr>
<td>D</td>
<td>$x^3y^5z (4x^2 - 18y^2 - 1)$</td>
</tr>
</tbody>
</table>

HINT:
Can you eliminate 2 quickly looking at coefficients?

A and B should be eliminated.

2 cannot be pulled out of the third term.

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

Underline the GCFs as you go.
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.

Which of the following is equivalent to the expression: 

\[-2a(b - 3) + (b - 3)\]  

| A. \((-2a + 1)(b - 3)\) | B. \((2a - 1)(b - 3)\) | C. \(-2ab - 6a + b - 3\) | D. \(-2a(b - 3) + 1\) |

**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