

# IB-HL 11th Grade Physics Summer Assignment 2017-2018

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## Simplifying Expressions

**Directions:** Please simplify the following expressions.

1.  $-(x^2 - 2x + 5) =$  \_\_\_\_\_

2.  $-(3x - 4y + 7) =$  \_\_\_\_\_

3.  $-(2a + 3b + 4c) =$  \_\_\_\_\_

4.  $-(-3a + 2b - c) =$  \_\_\_\_\_

5.  $-(3x + 7) + 2 =$  \_\_\_\_\_

6.  $2 - (4x - 8) =$  \_\_\_\_\_

7.  $[4x - 3(x - 1) + 6] =$  \_\_\_\_\_

8.  $[6x - 2(3x - 6) - 8] =$  \_\_\_\_\_

9.  $2[3(2x - 1) + 7] =$  \_\_\_\_\_

10.  $-8[2(3x + 4) - 2x] =$  \_\_\_\_\_

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## Adding and Subtracting Polynomials

**Directions:** Please add or subtract the following polynomials.

1.  $(12y^2 + 17y - 4) + (9y^2 - 13y + 3) =$

2.  $(2x^3 + 7x^2 + x) + (2x^2 - 4x - 12) =$

3.  $(3a^2 + 2a - 2) - (a^2 - 3a + 7) =$

4.  $(5x^2 - 2x - 1) - (3x^2 - 5x + 7) =$

5.  $-(3z^2 + 4z) - (6z^2 - 2) =$

6.  $(6x^3 - 4x^2 + x - 9) - (3x^2 + 7x + 3) =$

7.  $(-s^2 - 3) - (2s^2 + 10s) =$

8.  $(5 - 9a^3) + (4a^2 + 6a - 3) =$

9.  $(3x^2 - x) + 5x^3 + (4x^3 + x^2 - 8) =$

10.  $-10(u + v) + 8(u - 1) - 3(u + 6) =$

11.  $7x - [2(x^2 - z) + 4x^2 - 7z] + 6z^2 =$

12. Subtract  $t^4 - 3t^2 + 7$  from  $5t^3 - 9$ .

13. Add  $4(m^2 + 2)$  to  $3m^2 + 7m$ .

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## Translate Phrases into Mathematical Expressions

**Directions:** Please translate the following phrases into mathematical expressions. You do not need to show work for this page. Use “x” or your favorite letter for “a number”.

1. The sum of a number and ten. 1. \_\_\_\_\_
2. Eighteen more than a number. 2. \_\_\_\_\_
3. Five less than a number. 3. \_\_\_\_\_
4. The product of a number and three. 4. \_\_\_\_\_
5. The difference of a number and seven. 5. \_\_\_\_\_
6. The difference of seven and a number. 6. \_\_\_\_\_
7. Two more than a number. 7. \_\_\_\_\_
8. The difference of a number and eight, divided by ten. 8. \_\_\_\_\_
9. Three more than the sum of a number and four. 9. \_\_\_\_\_
10. Double the difference of a number and seven. 10. \_\_\_\_\_
11. Nine less than the product of a number and two. 11. \_\_\_\_\_
12. The quotient of two and three more than a number. 12. \_\_\_\_\_
13. The product of triple a number and five. 13. \_\_\_\_\_
14. Sixteen less than the sum of three and a number. 14. \_\_\_\_\_

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## Solving Equations

**Directions:** Please solve for the variable in each equation. All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet.

1.  $x + 37 = 98$  \_\_\_\_\_      2.  $y - 53 = 141$  \_\_\_\_\_      3.  $59 + a = -123$  \_\_\_\_\_

4.  $\frac{3}{4} + x = \frac{7}{8}$  \_\_\_\_\_      5.  $y - 3\frac{1}{2} = -2\frac{2}{3}$  \_\_\_\_\_      6.  $48x = -192$  \_\_\_\_\_

7.  $-25a = -200$  \_\_\_\_\_      8.  $-15y = 96$  \_\_\_\_\_      9.  $-\frac{1}{3}x = 48$  \_\_\_\_\_

10.  $51 - x = -133$  \_\_\_\_\_      11.  $-31t = -93$  \_\_\_\_\_      12.  $-53 + a = 65$  \_\_\_\_\_

13.  $\frac{x}{4} = -45$  \_\_\_\_\_      14.  $\frac{r}{-3} = \frac{1}{3}$  \_\_\_\_\_      15.  $\frac{11}{2}y = -3\frac{2}{3}$  \_\_\_\_\_

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## Re-Arranging Equations

**Directions:** Please re-arrange the following equations for the indicated variable. All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet.

1.  $A = p + prt$  for  $r$  \_\_\_\_\_

2.  $A = p + prt$  for  $t$  \_\_\_\_\_

3.  $V = lwh$  for  $l$  \_\_\_\_\_

4.  $V = lwh$  for  $h$  \_\_\_\_\_

5.  $A = \frac{1}{2} d_1 d_2$  for  $d_1$  \_\_\_\_\_

6.  $A = \frac{1}{2} d_1 d_2$  for  $d_2$  \_\_\_\_\_

7.  $y = mx + b$  for  $m$  \_\_\_\_\_

8.  $y = mx + b$  for  $b$  \_\_\_\_\_

9.  $p = \frac{100a}{t}$  for  $a$  \_\_\_\_\_

10.  $y = \frac{kx}{z}$  for  $x$  \_\_\_\_\_

11.  $A = 2\pi r$  for  $\pi$  \_\_\_\_\_

12.  $V = \pi r^2 h$  for  $h$  \_\_\_\_\_

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## Using the Quadratic Formula

**Directions:** Please solve for the roots of the following equations using the quadratic formula. All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet.

**Example:** Solve  $3x^2 - 5x + 1 = 0$  using the quadratic formula.

$$3x^2 - 5x + 1 = 0$$

$$a = 3 \quad b = -5 \quad c = 1$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(1)}}{2(3)}$$

$$x = \frac{5 \pm \sqrt{25 - 12}}{6} = \frac{5 \pm \sqrt{13}}{6}$$

**Quadratic formula:**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solve.

1.  $x^2 - 3x = 4$  \_\_\_\_\_

2.  $y^2 - 6y = -8$  \_\_\_\_\_

3.  $x^2 = 10x - 25$  \_\_\_\_\_

4.  $2y^2 - 7y - 15 = 0$  \_\_\_\_\_

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## The Pythagorean Theorem

**Directions:** If  $c$  is the measure of the hypotenuse of a right triangle, find each missing measure. Please round answers to the nearest hundredth. All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet.

1.  $a = 3$ ,  $b = 4$ ,  $c = \underline{\hspace{2cm}}$

2.  $a = 6$ ,  $c = 10$ ,  $b = \underline{\hspace{2cm}}$

3.  $b = 12$ ,  $c = 13$ ,  $a = \underline{\hspace{2cm}}$

4.  $a = 6$ ,  $c = 12$ ,  $b = \underline{\hspace{2cm}}$

5.  $a = 8$ ,  $b = 6$ ,  $c = \underline{\hspace{2cm}}$

6.  $a = 5$ ,  $c = 13$ ,  $b = \underline{\hspace{2cm}}$

7.  $b = 0.8$ ,  $c = 1.0$ ,  $a = \underline{\hspace{2cm}}$

8.  $a = 11$ ,  $b = 4$ ,  $c = \underline{\hspace{2cm}}$

9.  $a = \sqrt{12}$ ,  $b = 6$ ,  $c = \underline{\hspace{2cm}}$

10.  $b = 11$ ,  $c = \sqrt{289}$ ,  $a = \underline{\hspace{2cm}}$

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## Right Triangle Trigonometry

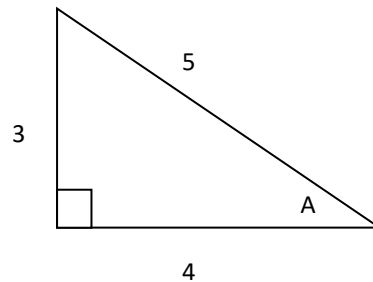
**Directions:** All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet. You may use your calculator to answer questions 2 – 4. Make sure your calculator is in “degree mode” before proceeding.

1. Answer the following for the triangle to the right.

a)  $\cos A =$  \_\_\_\_\_

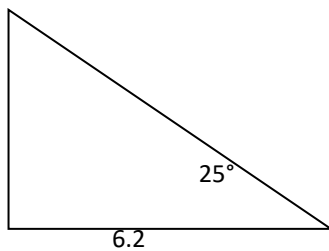
b)  $\sin A =$  \_\_\_\_\_

c)  $\tan A =$  \_\_\_\_\_

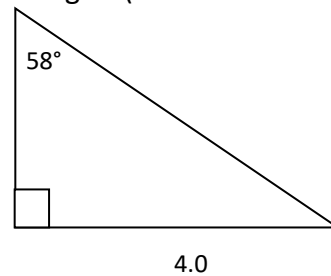


2. Solve for all sides and angles in the following right triangles (not drawn to scale).

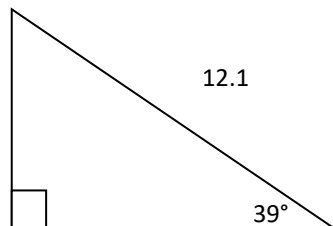
a)



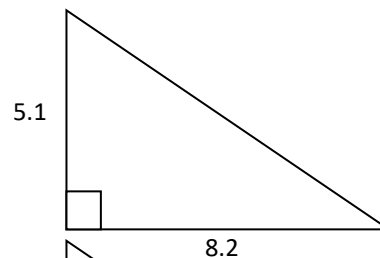
b)



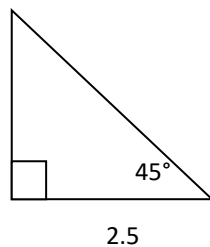
c)



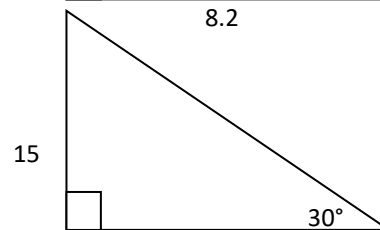
d)



e)



f)



3. Find the value of (answer should be to four places)

a)  $\tan 28^\circ =$  \_\_\_\_\_

b)  $\sin 86^\circ =$  \_\_\_\_\_

c)  $\cos 5^\circ =$  \_\_\_\_\_

4. Find the value of  $\theta$  if

a)  $\tan \theta = 9.5143$  \_\_\_\_\_

b)  $\sin \theta = .4540$  \_\_\_\_\_

c)  $\cos \theta = .8192$  \_\_\_\_\_



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## Motion Problems

**Directions:** Please use algebra and the distance equation shown below, **not** a guess-and-check approach. You may want to use subscripts to help organize your work; for example, use  $D_1$ ,  $T_1$  and  $R_1$  to denote the variables for car #1. All work must be shown for **every** problem on a separate sheet of paper. The final answer should be the only thing written on this page. Please staple all work to the back of this packet.

The formula to remember when doing *Motion Problems* is:

$$R \cdot T = D$$

Rate · Time = Distance

*A simple example is:*

If a person travels at the rate of 45 miles per hour for 2 hours the distance traveled is 90 miles.

$$45 \text{ mph} \cdot 2 \text{ hrs} = 90 \text{ miles}$$

$$R \cdot T = D$$

1. One car traveling at 30 miles per hour (mph) and another car traveling at 40 mph leave from the same place at the same time and travel in opposite directions. Calculate how long it will take before the cars are 630 miles apart.
2. Two trucks started traveling from the same place at 9:00 A.M. One truck traveled north at 45 mph while the other truck traveled south at 50 mph. At what time were the trucks 380 miles apart?
3. An airplane left Miami at the same time another plane left Santiago, Chile. The two planes flew toward each other at speeds of 625 mph and 575 mph, respectively. Calculate how long it took for the planes to pass each other. Note that Miami and Santiago are 4,200 miles apart.
4. Miami and Orlando are 210 miles apart. A truck traveled from Miami toward Orlando at the speed (rate) of 48 mph. Another truck traveled from Orlando toward Miami at the rate of 42 mph. Both trucks started traveling at the same time. How many miles did each travel before they met?
5. Two planes started at the same time from the same airport and flew in opposite directions. One of the planes flew 70 mph faster than the other. In 5 hours, the planes were 3,850 miles apart. Calculate the speed (rate) of each plane.
6. Two buses started from the same depot at the same time and traveled in the opposite direction. After traveling 4 hours, they were 480 miles apart. The rate of the fast bus was 10 mph greater than the slow bus. Calculate the rate of each bus.