To all students entering 10th grade Standard Math.

In order to keep our current math skills sharp, please complete this summer review packet. Use your previous class notes and work, websites such as Khan Academy and IXL and other math reference books for guides. Please complete before the first day of school in August 2022. You will be tested on this material when you return to school. If there are topics you are struggling with, please use the extra resources provided to practice!

Show all work, graphs and solutions clearly on a **separate** sheet of paper. Your work should be numbered and organized so it is easy to read. Solutions are not provided with this packet.

Have a good summer!

CDS Mathematics Department

Name:_____

10th grade Standard Summer Packet 2022

DUE on the FIRST day of SCHOOL

Formulas:

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Trig Functions	$\sin = \frac{opp}{hyp}; \cos = \frac{adj}{hyp}; \tan = \frac{opp}{adj}$
Cosine Rule	$a^2 = b^2 + c^2 - 2bc\cos A$ $\quad \cos A = \frac{b^2+c^2-a^2}{2bc}$ $b^2 = a^2 + c^2 - 2ac\cos B$ $\quad \cos B = \frac{a^2+c^2-b^2}{2ac}$ $c^2 = a^2 + b^2 - 2ab\cos C$ $\quad \cos C = \frac{a^2+b^2-c^2}{2ab}$
Sine Rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ or $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
Area of a triangle	$A = \frac{1}{2}ab\sin C$ or $A = \frac{1}{2}bh$
Arithmetic Series	$a_n = a_1 + (n-1)d$
Geometric Series	$a_n = a_1 r^{n-1}$
Probability of an event A	$P(A) = \frac{n(A)}{n(U)}$
Independent events (or with replacement)	$P(A \cap B) = P(A)P(B)$
Midpoint, Distance, Slope	$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ $\quad d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ $\quad m = \frac{y_2-y_1}{x_2-x_1}$

Simplifying Expressions (and solving quadratics)

Topic	Extra Help	Extra Practice (IXL)
Factoring and solving	https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-strategy/v/strategy-in-factoring-quadratics-1 https://www.khanacademy.org/math/algebra/quadratics	Algebra 2 Tab I.3, I.4, I.5
Distribution	https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-binomials-2/v/multiplying-binomials https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-polynomials-by-binomials/v/more-multiplying-polynomials	Algebra 2 Tab K.3
Index Laws	https://www.khanacademy.org/math/algebra2/exponential-growth-and-decay-alg-2/equivalent-forms-of-exponential-expressions/v/simplifying-an-exponential-expression	Algebra 1 Tab V.3, V.4, V.5, V.6, V.7, V.8
Radical Operations	https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/adding-and-simplifying-radicals https://www.khanacademy.org/math/algebra-home/alg-exp-and-log/miscellaneous-radicals/v/multiply-and-simplify-a-radical-expression-2	Algebra 2 Tab L.4, L.7, L.8, L.9, L.10, L.11
Complex Fractions	https://www.khanacademy.org/math/algebra2/rational-expressions-equations-and-functions/simplify-rational-expressions/v/simplifying-rational-expressions-introduction	Algebra 2 Tab N.4, N.5 N.6

Factoring and solving

1. $x^2 - 4x - 12$
2. $3x^2 - 75$
3. $2x^2 - 3x - 20$
4. $x^2 - 49 = 0$
5. $x^2 + 8x - 20 = 0$
6. $-8b^2 - 3b + 22 = 0$

Distributive Property

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

Index Laws

1. $(b^3)^5$
2. $a^4b^3c^5(a^2b^3c)$
3. $\frac{x^5y^{-2}}{x^{-6}y^{-9}}$
4. $\left(\frac{x^8}{xy^5}\right)^{-2}$

Operations with Radicals

1. $\frac{\sqrt{60}}{\sqrt{6}}$
2. $\sqrt{12a^6b^3}$
3. $5\sqrt{3} + 7\sqrt{5} - 12\sqrt{3}$
4. $-5\sqrt{20x^9y^{12}}$
5. $\sqrt{15}(\sqrt{6})$
6. $2\sqrt{27} - 8\sqrt{12}$
7. $\sqrt{5}(2\sqrt{10} - 3)$
8. $(\sqrt{5} - 2\sqrt{3})(\sqrt{10} + 3\sqrt{5})$

Solving Systems of Equations

Topic	Extra Help	Extra Practice IXL
Systems of Equations	https://www.khanacademy.org/math/algebra/systems-of-linear-equations	Algebra 2 Tab E.1, E.2, E.6, E.7, E.8 and E.9
Systems of Inequalities	https://www.khanacademy.org/math/algebra/two-variable-linear-inequalities	Algebra 2 Tab F.1 and F.2

Systems of Equations

1. Solve the following systems of equations:

   a. $y = x - 10$
   $5y + 10x = 10$

   b. $2x - 3y = 12$
   $4x + 10y = 16$

2. Solve the following system graphically: $x + y = -2$
   $2x - y = -7$

3. George bought a total of 8 lbs of peanuts and cashews. Peanuts, p, cost $2 per pound and cashews, c, cost $5 per pound. The total amount George spent on peanuts and cashews was $25. Create a system of equations to model this information and determine how many pounds of peanuts and cashews that George bought.

Systems of Inequalities

4. Which of the following is a solution to the given system of inequalities?
   $3x + y < 12$
   $x + y > 4$

   a. (3, 1)

   b. (4, 3)

   c. (2, 6)

   d. (6, 0)

5. At an ice cream parlor, ice cream cones cost x dollars each and sundaes cost y dollars each. The total cost of 4 cones and 3 sundaes is more than $20. The total cost of 5 cones and 1 sundae is less than $16. Which system of inequalities models this situation?

   a. $4x + 3y < 20$
   $5x + y > 16$

   b. $4x + 3y > 20$
   $5x + y < 16$

   c. $4x + 3y \geq 20$
   $4x + 3y < 20$

Geometry

Topic	Extra Help	Extra Practice IXL
Distance and Midpoint	https://www.khanacademy.org/math/geometry/hs-geo-analytic-geometry/hs-geo-distance-and-midpoints/v/distance-formula	Geometry Tab B.7, B.8, B.9
Slope and Linear Equations	1.https://www.khanacademy.org/math/algebra-basics/alg-basics-graphing-lines-and-slope/alg-basics-writing-slope-intercept/v/equation-of-a-line-1 2.https://www.khanacademy.org/math/geometry/hs-geo-analytic-geometry/hs-geo-parallel-perpendicular-eq/v/parallel-lines	Geometry Tab E.2, E.5, E.6
Pythagorean Theorem	https://www.khanacademy.org/math/basic-geo/basic-geometry-pythagorean-theorem	Geometry Tab Q.1, Q.2 Algebra 2 Tab Y.1
Parallel lines w/Transversals	https://www.khanacademy.org/math/geometry/hs-geo-foundations/hs-geo-angles/v/angles-formed-by-parallel-lines-and-transversals	Geometry Tab D.3, D.4

Distance, Slope and Midpoint

1. Find the midpoint given the following points:
   a. $(-2, 5), (3, 6)$ **b.** $(5, 9), (-7, -1)$ **c.** $(-4, -6)$ *and* $(-12, -19)$

2. Given the midpoint (M) and one endpoint (A), find the other endpoint (B):
   a. $M(-4, 6)$ *and* $A(5, 9)$ **b.** $M(3, -7)$ *and* $A(14, 12)$
3. Find the length and slope of the line between each given sets of points:
   a. $(3, 9), (7, 19)$ **b.** $(-4, -8), (4, 7)$ **c.** $(-3, 5)$ *and* $(6, -1)$
4. The distance between A and B is $\sqrt{34}$. Given $A(3, 6)$ *and* $B(x, 12)$, find the value of x.
5. A triangle has the vertices (-4, 1), (2, 5) and (-6, -4). Determine whether the triangle is equilateral, isosceles or scalene.

Linear Equations

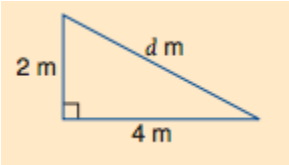
1. Write the equation of the line that goes through the point $(8, -2)$ with slope $-\frac{1}{2}$.

2. Write the equation of the line that goes through the point $(9, 12)$ and is parallel to the line $y = 3x - 4$.

3. Write the equation of the line that goes through the point $(-4, 5)$ and is perpendicular to the line $y = -\frac{1}{2}x - 9$.

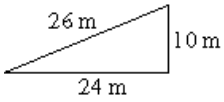
Pythagorean Theorem

1. Find the unknown side length:

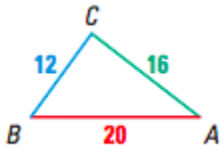


2. Determine if a triangle with the given side lengths is a right triangle:

a.



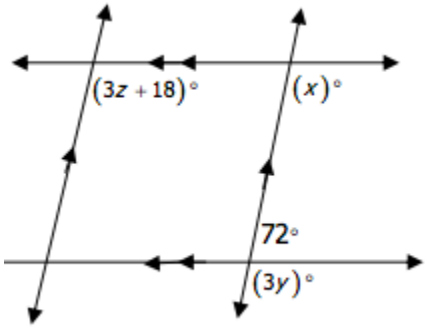
b.

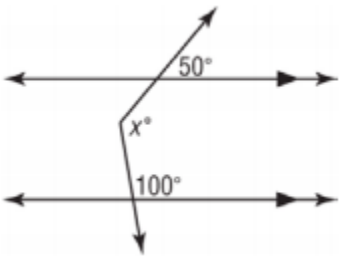


Parallel Lines w/Transversals

1. Find all unknown angles:

a.





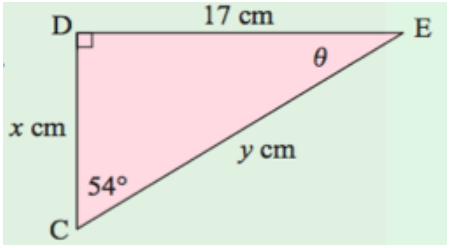
Trigonometry

Topic	Extra Help	Extra Practice IXL
Right Triangle Trig	https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles	Geometry Tab R.1, R.7, R.8, R.9, R.10
Special Right Triangles	https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles/trig-ratios-special-triangles/a/trig-ratios-of-special-triangles	Geometry Tab Q.4 Algebra 2 Tab Y.2
Non-Right Triangle Trig	https://www.khanacademy.org/math/trigonometry/trig-with-general-triangles	Geometry Tab R.11, R.12, R.13 Algebra 2 Tab Y.17, Y.18, Y.19

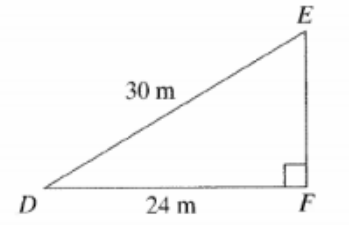
Right Triangle Trigonometry

1. Solve the given right triangles: (find unknown lengths and angles)

a.



b.



2. If a tree casts an 8m shadow and the angle from the ground to the top of the tree is 37°, what is the height of the tree? Round to the nearest meter.

3. Which of the following could be the side lengths of a 45-45-90 triangle?

a. $2,\ 4,\ 2\sqrt{2}$

b. $2,\ 4,\ 2\sqrt{3}$

c. $2,\ 2,\ 2\sqrt{2}$

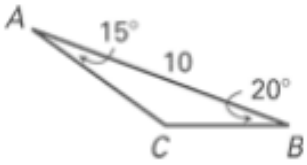
d. $4,\ 4,\ 4\sqrt{3}$

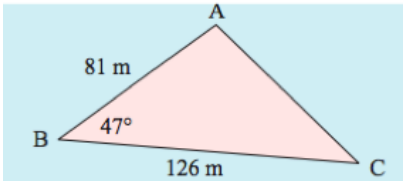
4. The hypotenuse of a 30-60-90 triangle is $12\sqrt{2}$. Find the area of the triangle.

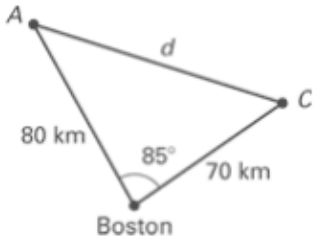
6. Lauren is at the top of a 15 m lookout tower. From an angle of depression of 25°, she sees Evan coming toward her. How far is Evan from the base of the tower?

Non-Right Triangle Trig

1. Solve the given non-right triangles (find unknown lengths and angles)







2. Two ships leave Boston Harbor at the same time. What is the distance between ships A and C after they have traveled 80 kilometers and 70 kilometers respectively?

3. Two observers are standing on shore ½ mile apart at points A and B and measure the angle to a sailboat at point C at the same time. Angle A is 63° and angle B is 56°. Find the distance from each observer to the sailboat.