

Name: _____

College Prep Precalculus Summer Assignment

This packet includes material your teacher expects you to know when you begin the course. It is designed to be done over the course of the summer to provide practice and highlight the concepts you learned in your previous math course.

Instructions:

- Complete the packet on loose leaf paper.
- Print your name and the course on the top of every sheet you use.
- Number your work and do the problems in order.
- Copy each problem before showing your work.
- Check your answers as you go (answers are included at the end of the packet).

The completed assignment is due on the first day of class and is worth *25 points* for all math courses. College Prep courses (not honors or AP) will take a *50-point Quiz* on the 3rd day of class.

Definitions:

Write the letter of the word that best matches each definition. Copy onto loose leaf – this page will not be collected.

Word Bank:

- | | | |
|-------------------|-------------------------|-------------------------|
| A. acute angle | B. angle | C. complementary angles |
| D. obtuse angle | E. ray | F. right angle |
| G. straight angle | H. supplementary angles | I. vertex |

1. _____ The joining of two rays at a common endpoint.
2. _____ The common endpoint which joins two rays.
3. _____ All points extending from a single point in a single direction.
4. _____ An angle measuring 180°
5. _____ An angle measuring 90°
6. _____ An angle greater than 0° but less than 90°
7. _____ An angle greater than 90° but less than 180°
8. _____ Two angles that sum to 90°
9. _____ Two angles that sum to 180°

Radicals: Simplify completely.

10. $3\sqrt{98}$

11. $\sqrt{\frac{3}{5}}$

12. $\frac{18}{\sqrt{2}}$

13. $5\sqrt{80}$

14. $\sqrt{20} \cdot \sqrt{2}$

15. $8\sqrt{2} \cdot 3\sqrt{6}$

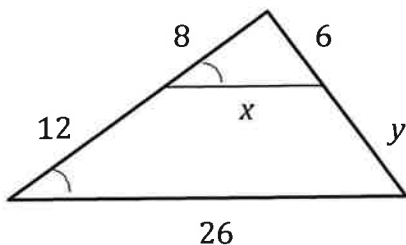
16. $\frac{3\sqrt{2}}{5\sqrt{3}}$

17. $\frac{\sqrt{10}}{3\sqrt{30}}$

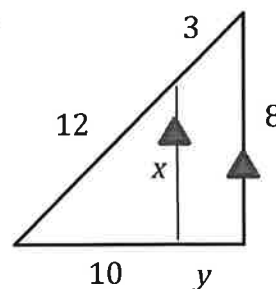
Similar Triangles: Two triangles are similar if corresponding angles are congruent. If two triangles are similar, corresponding sides are proportional.

Similar triangles are shown. Find the values of x and y .

18.



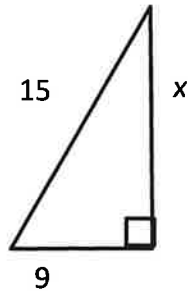
19.



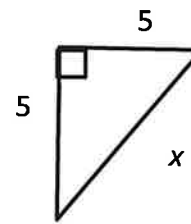
Pythagorean Theorem: In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs (If $\angle C$ in $\triangle ABC$ is a right angle, then $a^2 + b^2 = c^2$)

Find the value of x .

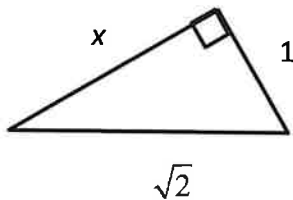
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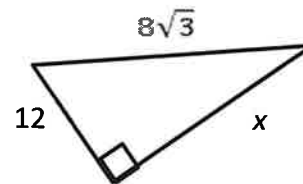
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22.

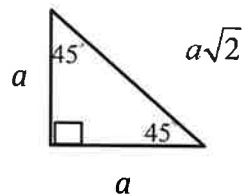


23.



Special Right Triangles (45-45-90):

A $45^\circ - 45^\circ - 90^\circ$ triangle is an isosceles right triangle with congruent legs. If the length of a leg is a , then the length of the hypotenuse is $a\sqrt{2}$.



Given the length of the legs, find the length of the hypotenuse of each $45^\circ - 45^\circ - 90^\circ$ triangle.

24. $3\sqrt{2}$

25. $5\sqrt{6}$

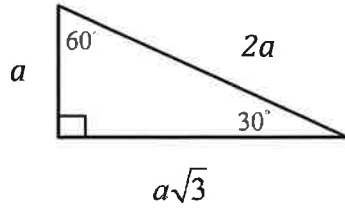
Given the length of the hypotenuse, find the length of the legs of each $45^\circ - 45^\circ - 90^\circ$ triangle.

26. 10

27. $4\sqrt{3}$

Special Right Triangles (30-60-90):

In a $30^\circ - 60^\circ - 90^\circ$ triangle, the shorter leg is opposite the 30° angle and the longer leg is opposite the 60° angle. If the shorter leg has a length a , then the hypotenuse has length $2a$ and the longer leg has the length $a\sqrt{3}$.



Using the side given, find the other two sides of each $30^\circ - 60^\circ - 90^\circ$ triangle.

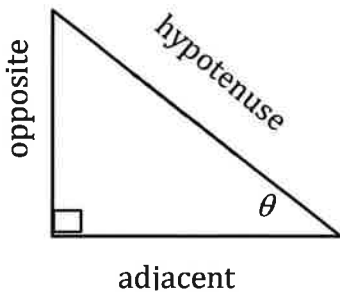
28. Short leg: $8\sqrt{3}$

29. Hypotenuse: 12

30. Long leg: $\sqrt{6}$

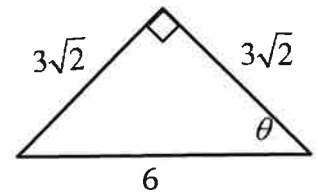
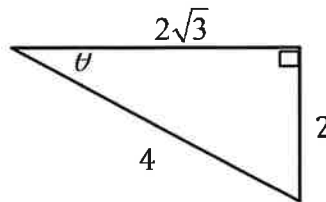
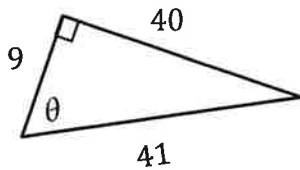
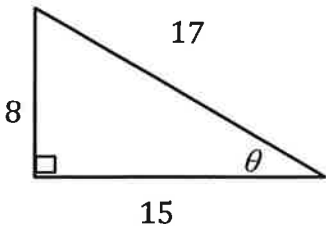
31. Hypotenuse: $4\sqrt{2}$

SOH CAH TOA:



$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$
$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$
$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$

Express sin, cos, and tan of θ as ratios for each triangle.



32. $\sin \theta =$
 $\cos \theta =$
 $\tan \theta =$

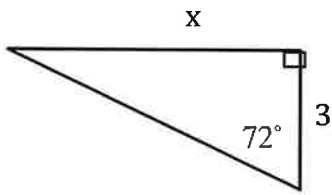
33. $\sin \theta =$
 $\cos \theta =$
 $\tan \theta =$

34. $\sin \theta =$
 $\cos \theta =$
 $\tan \theta =$

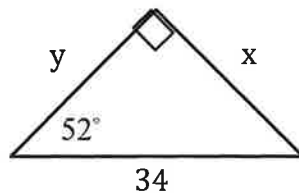
35. $\sin \theta =$
 $\cos \theta =$
 $\tan \theta =$

Write and solve a trig equation to find the values of x and y to the nearest tenth. Make sure your calculator is in degree mode.

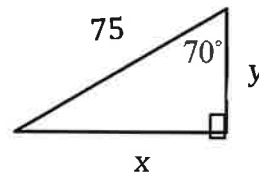
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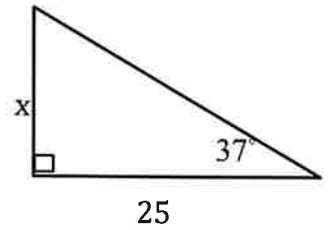
37.



38.

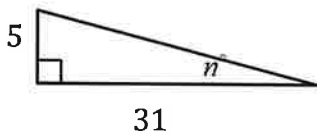


39.

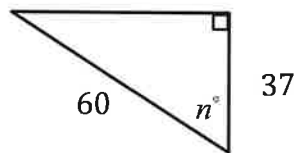


Write and solve a trig equation to find n° to the nearest degree. Make sure your calculator is in degree mode.

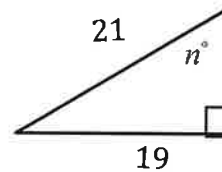
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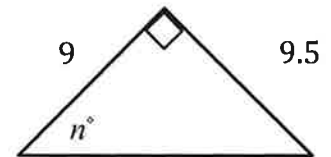
41.



42.



43.



Applications of Right Triangle Trigonometry:

Angle of elevation: If a person on the ground looks up to the top of a building, the angle formed between the line of sight and the horizontal

Angle of depression: If a person standing on the top of a building looks down at an object on the ground, the angle formed between the line of sight and the horizontal

44. From a point 80 meters from the base of a tower, the angle of elevation to the top of the tower is 28° . How tall is the tower?

45. The angle of depression from the top of a tower to a boulder on the ground is 38° . If the tower is 25 meters high, how far from the base of the tower is the boulder?

Unit Conversions: Perform the following conversions. Round answers to two decimal places if necessary. Make sure to show your unit analysis!

Example: Convert 2 days into seconds $2 \text{ days} \cdot \frac{24 \text{ hours}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 172,800 \text{ sec}$

Conversions

1 hour = 3600 seconds

1 mile = 5280 feet

1 yard = 3 feet

1 meter = 3.28 feet

1 km = 0.62 miles

1 foot = 12 inches

1 kg = 2.2 lbs.

1 lb. = 0.45 kg

1 inch = 2.54 cm = 25.4 mm

- 46. 565,900 seconds into days
- 47. 17 years into minutes
- 48. 43 miles into feet
- 49. 165 pounds into kilograms
- 50. 100 yards into meters
- 51. 22,647 inches into miles
- 52. 1100 feet per second into miles per hour
- 53. 53 yards per hour into inches per week
- 54. 721 lbs. per week into kg per second
- 55. 88 inches per second into miles per day

Function Transformations:

- 1. Describe the transformations for each function. (vertical shift, horizontal shift, reflection, vertical stretch, vertical compression) with respect to its parent function. Parent functions are $y = |x|$; $y = x^2$; $y = \sqrt{x}$.
- 2. Identify the domain and range for each function.
- 3. Graph each function (all graphs are to be done on graph paper). You should check your graphs using your calculator.

56. $y = |x - 4| + 3$

57. $y = |x + 5| - 1$

58. $y = 2|x|$

59. $y = -\frac{1}{3}|x|$

60. $y = (x + 3)^2 + 6$

61. $y = (x - 8)^2 - 2$

62. $y = -2x^2$

63. $y = \frac{1}{2}x^2$

64. $y = \sqrt{x - 5} - 2$

65. $y = \sqrt{x + 3} + 1$

66. $y = -\frac{1}{2}\sqrt{x}$

67. $y = 4\sqrt{x}$

Factoring: Factor the following expressions completely.

68. $n^2 - 8n$

70. $4x^3 + 38x^2 + 90x$

72. $4x^2 + 12x + 9$

74. $8k^3 - 8k^2 + 3k - 3$

69. $b^2 - 14b + 40$

71. $14a^2 - 2a - 12$

73. $16m^2 - 1$

75. $m^4 - m^2 - 12$

Solve: Use the most efficient method possible.

76. $4n^2 + 9 = 157$

78. $4r^2 = 25$

80. $6a^2 - 8 = 28$

77. $3x^2 - 28 = 5x$

79. $25b^2 - 60b = -36$

81. $10v^2 = 6v - 8$

Pre-Calculus Summer Review Packet – Answers

1. B	2. I	3. E	4. G
5. F	6. A	7. D	8. C
9. H	10. $21\sqrt{2}$	11. $\frac{\sqrt{15}}{5}$	12. $9\sqrt{2}$
13. $20\sqrt{5}$	14. $2\sqrt{10}$	15. $48\sqrt{3}$	16. $\frac{\sqrt{6}}{5}$
17. $\frac{\sqrt{3}}{9}$	18. $x=10.4, y=9$	19. $x=6.4, y=2.5$	
20. 12	21. $5\sqrt{2}$	22. 1	23. $4\sqrt{3}$
24. 6	25. $10\sqrt{3}$	26. $5\sqrt{2}$	27. $2\sqrt{6}$
28. $24, 16\sqrt{3}$	29. $6, 6\sqrt{3}$	30. $\sqrt{2}, 2\sqrt{2}$	31. $2\sqrt{2}, 2\sqrt{6}$
$\sin \theta = 8/17$ 32. $\cos \theta = 15/17$ $\tan \theta = 8/15$	$\sin \theta = 40/41$ 33. $\cos \theta = 9/41$ $\tan \theta = 40/9$	$\sin \theta = 1/2$ 34. $\cos \theta = \sqrt{3}/2$ $\tan \theta = \sqrt{3}/3$	$\sin \theta = \sqrt{2}/2$ 35. $\cos \theta = \sqrt{2}/2$ $\tan \theta = 1$
36. $x \approx 9.2$	37. $x \approx 26.8, y \approx 20.9$	38. $x \approx 70.5, y \approx 25.7$	39. $x \approx 18.8$
40. $n \approx 9^\circ$	41. $n \approx 52^\circ$	42. $n \approx 65^\circ$	43. $n \approx 47^\circ$
44. ≈ 42.5 m	45. ≈ 32 m	46. ≈ 6.55 days	47. 8,935,200 min
48. 227,040 ft	49. 75 kg	50. ≈ 91.46 m	51. ≈ 0.36 miles
52. 750 mi/hr	53. 320,544 in/wk	54. $\approx 5.42 \times 10^{-4}$ kg/sec	55. 120 mi/day
56. shift right 4, up 3 D:all \mathbb{R} R: $y \geq 3$	57. shift left 5, down 1 D:all \mathbb{R} R: $y \geq -1$	58. vertical stretch D:all \mathbb{R} R: $y \geq 0$	59. vertical comp/refl. D:all \mathbb{R} R: $y \leq 0$
60. shift left 3, up 6 D:all \mathbb{R} R: $y \geq 6$	61. shift right 8, down 2 D:all \mathbb{R} R: $y \geq -2$	62. vertical stretch/refl. D:all \mathbb{R} R: $y \leq 0$	63. vertical comp D:all \mathbb{R} R: $y \geq 0$
64. shift right 5, down 2 D: $x \geq 5$ R: $y \geq -2$	65. shift left 3, up 1 D: $x \geq -3$ R: $y \geq 1$	66. vertical comp/refl. D: $x \geq 0$ R: $y \geq 0$	67. vertical stretch D: $x \geq 0$ R: $y \geq 0$
68. $n(n-8)$	69. $(b-10)(b-4)$	70. $2x(2x+9)(x+5)$	71. $2(7a+6)(a-1)$
72. $(2x+3)^2$	73. $(4m+1)(4m-1)$	74. $(8k^2+3)(k-1)$	75. $(m+2)(m-2)(m^2+3)$
76. $\pm\sqrt{37}$	77. $-\frac{7}{3}, 4$	78. $\pm\frac{5}{2}$	79. $\frac{6}{5}$
80. $\pm\sqrt{6}$	81. $\frac{3 \pm i\sqrt{71}}{10}$		

