To: Advanced Precalculus Honors Students for the 2026-27 School year
From: The Advanced Precalculus Honors Teachers (Mrs. Skowronski and Mr. Kieffer)

We are SO excited to have you in our classes next year! We cannot wait to meet you all and we want to make sure that ALL of you start the year off on the right foot. We have compiled some topics that we know students need to be good at coming into the course, so they can start strong. The following topics are things that you SHOULD be able to do well:

- Operations with Fractions
- Complex Fractions**
- Simplifying Radicals
- Solving quadratic equations (by factoring or quadratic formula)
- Multiplying Polynomials**
- Factoring binomials and trinomials**
- Solving linear systems by substitution or elimination
- End behavior of polynomials
- Special Right Triangles**
- Graphing Rational Functions

Anything that is starred above are things that we have put into this packet. It is HIGHLY recommended that you do this packet throughout the summer, so you are not playing catch-up in August. As each starred topic is needed throughout the year, we will quickly refresh it (minus factoring – this you NEED to be good at coming into our course!). The items that are not starred are not in this packet. If you know you may be weak in one of those areas, we suggest you review it on your own.

Note: The expectation is that you can do ALL of these topics WITHOUT access to a calculator of any kind. All of these answers should be exact (no approximations).

For any of these topics, if you are confused, Khan Academy has a ton of great videos around these topics – just search! Youtube may also be useful, but not all videos are good, so use with caution.

If you would like answers to your work, please email Mrs. Skowronski at kskowronski2@cherrycreekschools.org or Mr. Kieffer at mkieffer2@cherrycreekschools.org – be patient as you may not get a response immediately! Email will only be checked about once a week.

Factoring Practice Name: _____

Section A- Choose the correct factorization. If neither is correct, find the correct factorization.

1) $3x^2 + 7x - 6$
a) $(3x - 1)(x + 6)$
b) $(3x - 2)(x + 3)$

2) $6x^2 - 7x - 3$
a) $(3x - 1)(2x - 3)$
b) $(6x - 1)(x + 3)$

3) $4x^2 - 21x + 5$
a) $(4x - 1)(x - 5)$
b) $(2x - 1)(2x - 5)$

Factor the trinomial.

4) $2x^2 + 9x + 7$

5) $5x^2 + 12x - 9$

6) $6x^2 - 3x - 3$

7) $4x^2 - 10x - 14$

8) $5x^2 + 41x - 36$

9) $4x^2 + 37x + 40$

Section B

Factor the sum or difference of cubes (you NEED to know how to do this!)

10) $x^3 + 64$

11) $x^3 - 343$

12) $27x^3 - 8$

13) $64x^3 + 27$

Factor the polynomial, completely, by grouping.

14) $x^3 - 3x^2 + 5x - 15$

15) $3x^3 - 12x^2 + 2x - 8$

16) $x^3 - 2x^2 - 4x + 8$

17) $4x^3 - 4x^2 - 9x \mp 9$

Factor the polynomial completely.

18) $16x^4 - 81$

19) $x^4 + x^2 - 6$

20) $2x^4 - 200x^2$

21) $3x^4 - 3$

Section C- Factor the polynomial completely.

22) $x^3 + 729$

23) $40x^3 + 5$

24) $x^4 - 64$

25) $x^3 - x^2 + 3x - 3$

26) $8x^4 + 8x^3 - x - 1$

27) $3x^3 + 12x^2 - 3x - 12$

28) $x^6 + x^5 - x^4 - x^3$

Complex Fraction Practice

Simplify each expression.

1) $\dfrac{4}{\frac{3}{4}-\frac{3}{2}}$

2) $\dfrac{\frac{4}{5}}{\frac{2}{25}-\frac{5}{16}}$

3) $\dfrac{9}{\frac{9}{2x^2}+\frac{3}{x}}$

4) $\dfrac{a^2}{\frac{4}{5}-\frac{4}{a}}$

5) $\dfrac{\frac{25}{12}+\frac{x+1}{4}}{\frac{1}{18}-\frac{x+1}{36}}$

6) $\dfrac{\frac{16}{m-3}-\frac{4}{m-4}}{\frac{16}{m^2}-\frac{m-4}{m-3}}$

7) $\dfrac{\frac{x-6}{6}-\frac{x-2}{x-6}}{\frac{36}{x-2}+\frac{4}{9}}$

8) $\dfrac{\frac{1}{2}-\frac{x+5}{4}}{\frac{x^2}{2}-\frac{5}{2}}$

Multiplying Special Binomials

Find the product of each of the following.

1) $(x+2)^2$

2) $(x-1)^2$

3) $(x+2)(x-2)$

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

5) $(x+8)^2$

6) $(10+x)^2$

7) $(2x+3)(2x-3)$

8) $(10-x)(10+x)$

9) $(3x-5)^2$

10) $(4x+9)^2$

11) $(5x+3)(5x-3)$

12) $(7x-2)(7x+2)$

13) $(3x-8)^2$

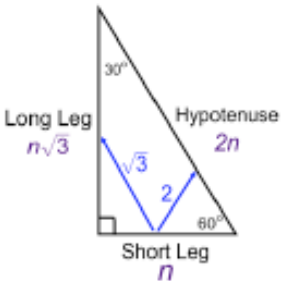
14) $(10x-7)(10x+7)$

15) $(9x-2)^2$

Special Right Triangles: 30° - 60° - 90°

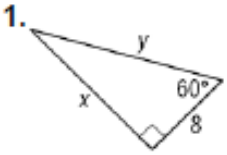
Hypotenuse = 2 * Short Leg

Long Leg = Short Leg * $\sqrt{3}$

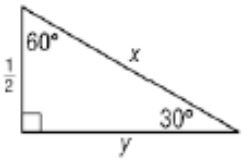


Find the value of x and y in each triangle.

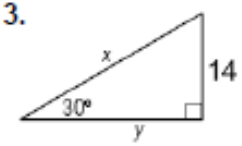
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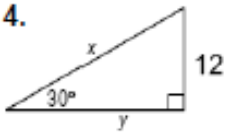
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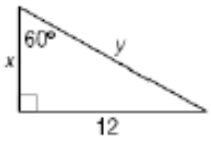
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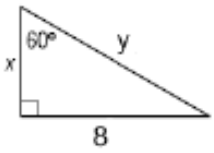
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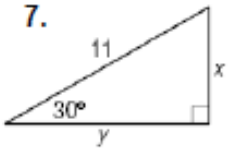
5.



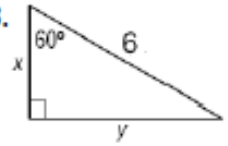
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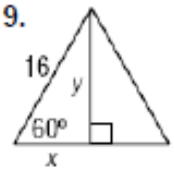
7.



8.



9.



Sketch the figure that is described. Then, find the requested measure.

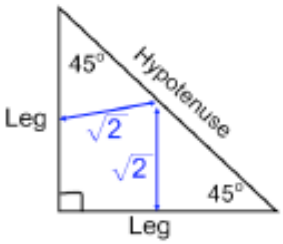
10. An equilateral triangle has a side length of 10 inches. Find the length of the triangles altitude.

11. The altitude of an equilateral triangle is 18 inches. Find the length of a side.

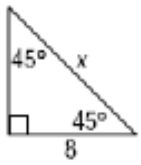
Special Right Triangles: 45° - 45° - 90°

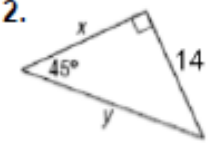
Hypotenuse = Leg * $\sqrt{2}$ $\sqrt{2}$

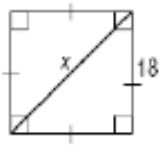
Leg = $\frac{\text{hypotenuse}}{\sqrt{2}}$

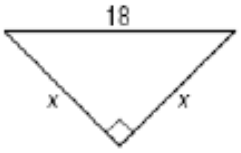


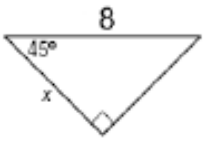
Find the value of x in each triangle.

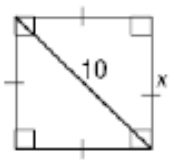
1. 

2. 

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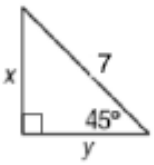
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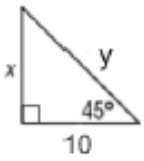
Sketch the figure that is described. Find the requested measure.

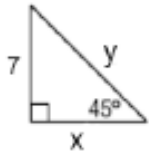
7. The perimeter of a square is 48 meters. Find the length of a diagonal.

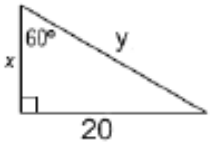
8. The perimeter of a square is 20 cm. Find the length of a diagonal.

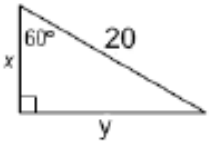
Find the value of x and y in each figure.

9. 

10. 

11. 

12. 

13. 

14. 