Name: _____

The real first exam will not have this many questions! These are here for additional practice.

The real first exam will also have questions from section 11.1 which we have not yet reached in class.

You may *not* use a calculator for the first part of this exam. You may *not* use notes or the text book at any point. Scratch paper and a straight-edge might be useful, and you may use these.

Read each problem carefully, and follow all the instructions.

Show all of your work. When possible, check your answers. If appropriate, write a conclusion statement.

Exam 1 Score _____

Exam 1 Weight _____

Attendance Average _____

WeBWorK Average _____

Overall, as of this exam _____

We have completed _____% of the graded items in the course

No Calculator Portion

You may *not* use a calculator with capabilities beyond basic arithmetic for this part of this exam.

1. The real first exam will not have this many questions! These are here for additional practice. The real first exam will also include some questions from section 11.1. We haven't reached that point in class yet.

2. What did Alex say is the basic reason we study factoring?

3. Fully factor these polynomials. (Or state that it is prime.) Where appropriate, use aligned equals signs and progress through your steps one line at a time. Keep any scratch work like a diagram or factor pair table off to the side.

   a) $17x + 34$

   b) $13y^4 - 8y$

   c) $2x^3 + 3x^2 + 10x + 15$

   d) $16xy + 40x + 6y + 15$

   e) $16t^3 - 8t^2 + 12t - 6$

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

g) $q^2 - 9q + 20$

h) $x^2 - 5x - 6$

i) $x^2 + 2x + 10$

j) $13z^2 + 39z + 26$

k) $x^{12} - 7x^{11} - 18x^{10}$

l) $5y^2 - 16y + 3$

m) $3x^2 + 13x - 10$

n) $35t^2 + 28t - 7$

o) $4x^9 + 18x^8 + 14x^7$

p) $x^2 - 49$

q) $16y^4 - 81$

r) $x^2 + 4$

s) $18y^2 - 2$

t) $x^2 + 20x + 100$

u) $4x^2 - 28x + 49$

v) $x^3 + 5x^2 - 9x - 45$

4. The area of a rectangle is $k^2 + 12k + 35$ square inches. Assuming that its width and height are simple linear mathematical expressions in k, what could the width be and what could the height be?

5. The revenue from selling a product is the number of items sold multiplied by the price per item. If the revenue from one day's sales is $2x^2 - 9x - 5$, what could the number of items sold be and what could the price per item be? (Assume these things are simple linear mathematical expressions in x.)

6. Draw a picture involving rectangles that explains why $A^2 - B^2 = (A+B)(A-B)$.

7. Draw a picture involving rectangles that explains why $A^2 + 2AB + B^2 = (A+B)^2$.

8. Solve each of these equations using factoring. (If you happen to know some other way to solve the equation that doesn't use factoring, don't use that method. It will not be worth credit. You are being assessed on your understanding of how to use factoring.)

a) $x^2 - 7x + 6 = 0$

b) $x^2 + 11x = 0$

c) $x^2 + 24x + 144 = 0$

d) $2x^2 = 7x + 4$

e) $4x^2 - 25 = 0$

f) $(x-1)(x+4) = 66$

g) $6w^2 = 48w - 72$

h) $x^3 + 3x^2 - 25x = 75$

Calculator Portion

For these exercises you may use a calculator. The expectation is that you probably should use a calculator. But you still should follow the directions.

9. Factor $42x^2 - 61x - 15$.

10. If a football league has N teams, then there must be $\frac{1}{2}N^2 - \frac{1}{2}N$ games in a "round robin" tournament (where each team plays every other team). Solve an equation (using factoring) to find how many teams are there if a round robin tournament has 561 games. *After you write down an equation, it might be a good idea to multiply through by something that clears denominators.*

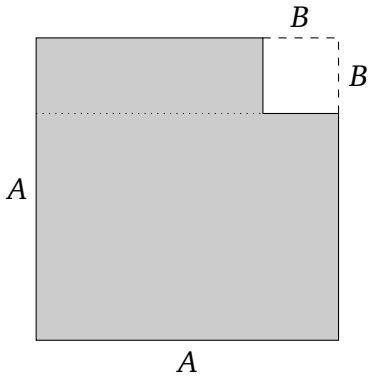
11. When you stand on top of a certain skyscraper and throw a javelin straight up in the air, it eventually turns and falls all the way to the street below. Since the building height is 407 feet, and you throw the javelin with an initial speed of 14 feet per second, the height of the javelin after t seconds is

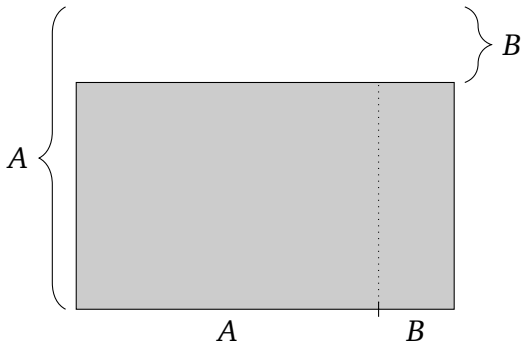
$$-16t^2 + 14t + 407$$

(That "−16" has to do with how strong gravity is on Earth.) Solve an equation (using factoring) to find how long it will take for the javelin to hit the ground.

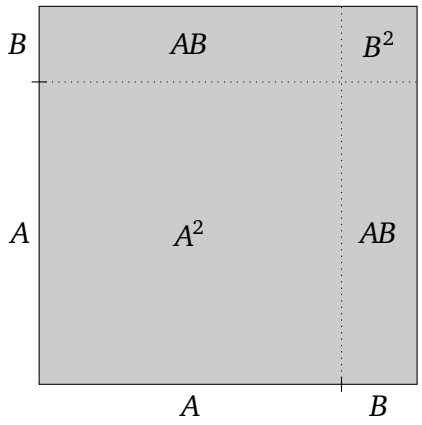
Answers

1. OK.
2. Factoring becomes useful in unexpected ways.
3. a) $17(x+2)$
   b) $y(13y^3-8)$
   c) $(x^2+5)(2x+3)$
   d) $(8x+3)(2y+5)$
   e) $2(4t^2+3)(2t-1)$
   f) $x^3(x^2+1)(x-5)$
   g) $(q-4)(q-5)$
   h) $(x+1)(x-6)$
   i) prime
   j) $13(z+1)(z+2)$
   k) $x^{10}(x-9)(x+2)$
   l) $(5y-1)(y-3)$
   m) $(3x-2)(x+5)$
   n) $7(5t-1)(t+1)$
   o) $2x^7(2x+7)(x+1)$
   p) $(x+7)(x-7)$
   q) $(2y+3)(2y-3)(4y^2+9)$
   r) prime
   s) $2(3y-1)(3y+1)$
   t) $(x+10)^2$
   u) $(2x-7)^2$
   v) $(x-3)(x+3)(x+5)$
4. The width could be $k+5$ and the height could be $k+7$, or vice versa.
5. The number of items sold could be $2x+1$ and the price per item could be $x-5$, or vice versa.
6. The left picture has shaded area A^2-B^2. The right picture has shaded area $(A+B)(A-B)$.





   But the two areas are the same, just moving a rectangle.
7. On the one hand, the four pieces add up to $A^2+2AB+B^2$.



On the other hand, the whole thing is a square with side $A+B$, so its area is $(A+B)^2$.

8. a) $\{1,6\}$ b) $\{-11,0\}$
   c) $\{-12\}$ d) $\left\{-\frac{1}{2},4\right\}$
   e) $\left\{-\frac{5}{2},\frac{5}{2}\right\}$ f) $\{-10,7\}$
   g) $\{2,6\}$ h) $\{-5,3,5\}$

9. $(14x+3)(3x-5)$

10. There are 34 teams.

11. It will take 5.5 seconds for the javelin to hit the ground.