Math 10 Multiplying Polynomials Solutions
(DO NOT WRITE ON THIS PAPER)

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

2. $2x^2(2-3x+4x^2)$
   $8x^4-6x^3+4x^2$

3. $(x-3)(x-5)$
   $x^2-8x+15$

4. $(3x-2)(x-3)$
   $3x^2-11x+6$

5. $(2x-7)^2$
   $(2x-7)(2x-7)$
   $4x^2-28x+49$

6. $-3(5-2x)^2$
   $-3(25-20x+4x^2)$
   $=-75+60x-12x^2$
   $=-12x^2+60x-75$

7. $2(3x-1)(x-2)$
   $2(3x^2-7x+2)$
   $=6x^2-14x+4$

8. $(x+2)(-2)(x-4)$
   $-2(x+2)(x-4)$
   $=(-2x-4)(x-4)$ or $-2(x^2-2x-8)$
   $=-2x^2+4x+16$

9. $(x-1)(x^2+x+1)$
   $x^3+x^2+x-x^2-x-1$
   $=x^3-1$

10. $(a+b)(a^2-ab+b^2)$
    $a^3-a^2b+ab^2+a^2b-ab^2+b^3$
    $=a^3+b^3$

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

12. $(x-2)^2(x+1)^2$

$= (x^2-4x+4)(x^2+2x+1)$

$= x^4+2x^3+x^2$

$\quad -4x^3-8x^2-4x$

$\quad\quad +4x^2+8x+4$

$= x^4-2x^3-3x^2+4x+4$

13. $(3x-3y)^3$

$(3x-3y)(9x^2-18xy+9y^2)$

$27x^3-54x^2y+27xy^2$

$\quad -27x^2y+54xy^2-27y^3$

$27x^3-81x^2y+81xy^2-27y^3$

14. $(2x-1)^4$

$= (2x-1)^2(2x-1)^2$

$= (4x^2-4x+1)(4x^2-4x+1)$

$= 16x^4-16x^3+4x^2$

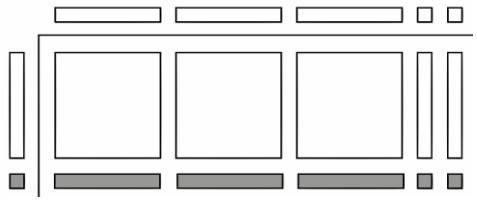
$\quad -16x^3+16x^2-4x$

$\quad\quad 4x^2-4x+1$

$= 16x^4-32x^3+24x^2-8x+1$

15. Represent the product of the following factors using algebra tiles:

$(3x+2)(x-1)$



16. The length of an edge of a cube is $x-1$.

a. Find the volume of the cube in the form ax^3+bx^2+cx+d

$V = (x-1)^3$

$= (x-1)(x^2-2x+1)$

x^3-3x^2+3x-1

b. Find the area of the cube.

$A = 6\times(x-1)^2$

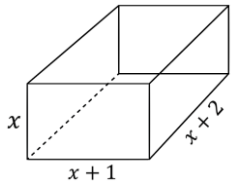
$= 6(x^2-2x+1)$

$= 6x^2-12x+6$ units^2

c. Find the volume given $x=3$

$V = (3)^3-3(3)^2+3(3)-1$ or $V=(3-1)^3 = 8$ units^3

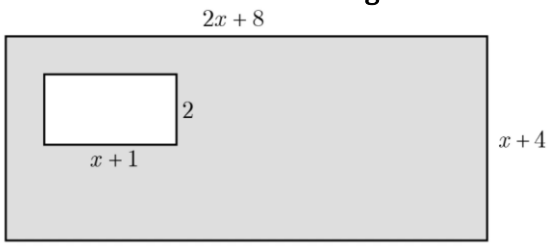
17. See box below:



Find the surface area of the top of the box only in the form $ax^2 + bx + c$

$y = (x + 1)(x + 2) = x^2 + 3x + 2$

18. Find the area of the shaded region below:



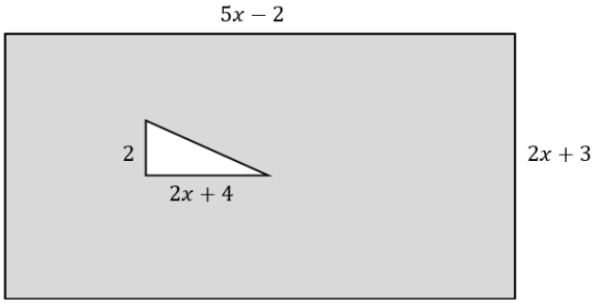
$A = A_{shaded} - A_{white}$

$= (2x + 8)(x + 4) - 2(x + 1)$

$= 2x^2 + 16x + 32 - 2x - 2$

$= 2x^2 + 14x + 30$

19. Find the area of the shaded region below:

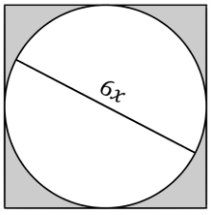


$A = (5x - 2)(2x + 3) - \frac{1}{2}(2)(2x + 4)$

$= 10x^2 + 11x - 6 - (2x + 4)$

$= 10x^2 + 9x - 10$ un²

20. Find the area of the shaded region below:



$A = (6x)(6x) - \pi(3x)^2 = 36x^2 - 9\pi x$ un²

21. The diameter of a circle is $2x + 4$.

a. Area in expanded form?

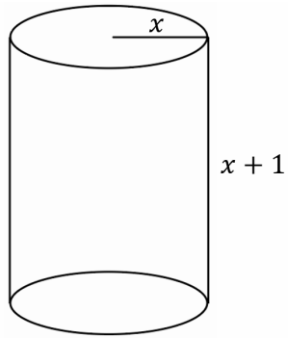
$A = \pi(x + 2)^2$

$= \pi(x^2 + 4x + 4)$

$= \pi x^2 + 4\pi x + 4\pi$

b. Circumference?
$= \pi(2x + 4)$
$2\pi x + 4\pi$

22. See cylinder below:

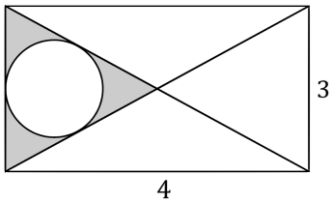


a. Volume in expanded form?
$V = \pi r^2 h = \pi(x^2)(x + 1)$
$= \pi(x^3 + x^2)$
$= \pi x^3 + \pi x^2$ un³

b. Total surface area including the bottom (in expanded form)?
$= 2\ \text{circles} + \text{side} = 2\pi r^2 + 2\pi rh$
$= 2\pi x^2 + 2\pi x(x + 1)$
$= 2\pi x^2 + 2\pi x^2 + 2\pi x$
$= 4\pi x^2 + 2\pi x$ un²

Challenge

23. Find the area of the shaded region.



Using the Pythagorean Theorem two sides of the shaded triangle has length 2.5
The area of a triangle $A_\Delta = \frac{a+b+c}{2} \times r$ (prove this for fun!)
$A_\Delta = \frac{bh}{2} = \frac{3\times 2}{2} = 3$
Thus $3 = \frac{a+b+c}{2} \times r$
$3 = \frac{3+2.5+2.5}{2} \times r$
Multiply both sides by 2
$6 = 8r$
$r = \frac{6}{8} = \frac{3}{4}$
The area of the circle is $\pi r^2 = \pi\left(\frac{3}{4}\right)^2 = \frac{9\pi}{16}$
Thus $A_{\text{shaded}} = 3 - \frac{9\pi}{16}$