1. Sydney Harbour Bridge in Australia is usually wide for a long-span bridge. It carries two rail lines, eight road lanes, a cycle lane, and a walkway.

a. Factor the expression $10x^2 - 7x - 3$ to find the length and the width of the bridge.

$10x^2 - 7x - 3$

$10x^2 + 3x - 10x - 3$

$x(10x+3) - (10x+3)$

$(10x+3)(x-1)$

length, width

M	A	N
-30	-7	3, -10

b. If x represents 50 m, what are the length and the width of the bridge, in metres?

length $= 10x + 3$
$= 10(50) + 3$
$= 503\text{m}$

width $= x - 1$
$= 50 - 1$
$= 49\text{m}$

2. The height of a ball thrown from the top of a building can be approximated by the formula $h = -5t^2 + 15t + 20$, where *t* is the time, in seconds, and *h* is the height, in metres.

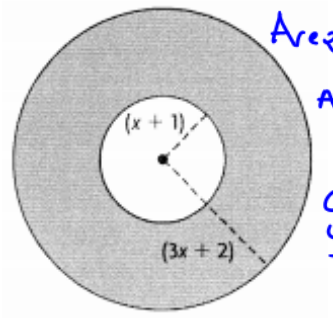
a. Write the formula in factored form. Hint: Remove the GCF first

$= -5(t^2 - 3t - 4)$

$= -5(t+1)(t-4)$

3. Determine a simplified **factored** expression for the area of shaded region.

a.



Area of Big Circle $= \pi r_1^2 = \pi(3x+2)^2$

Area of Small Circle $= \pi r_2^2 = \pi(x+1)^2$

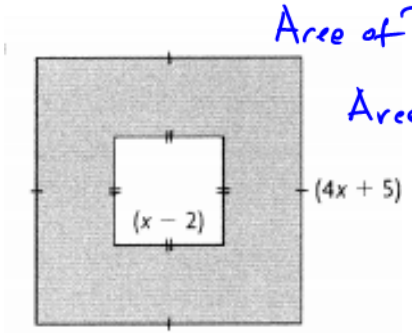
Shaded Area $= \pi(3x+2)^2 - \pi(x+1)^2$ ⇒ DOS

$= \pi\left[(3x+2)^2 - (x+1)^2\right]$

$= \pi(3x+2-x-1)(3x+2+x+1)$

$= \pi(2x+1)(4x+3)$

b.



Area of Big Square $= (4x+5)^2$

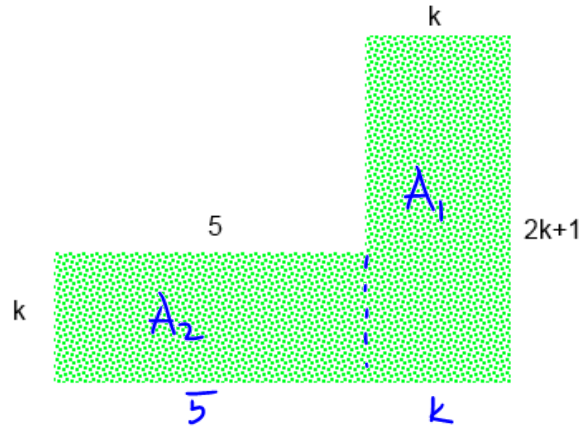
Area of small $\square = (x-2)^2$

Shaded Area $= (4x+5)^2 - (x-2)^2$

$= (4x+5-x+2)(4x+5+x-2)$

$= (3x+7)(5x+3)$

c.



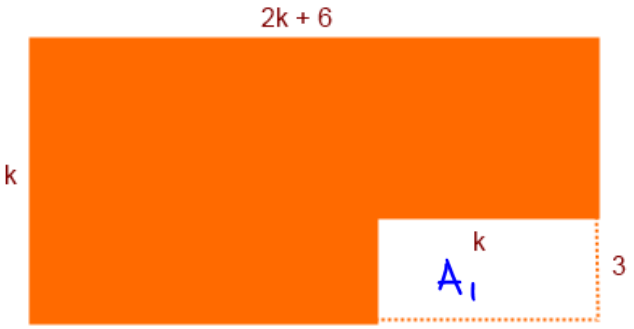
$A_1 = k(2k+1) = 2k^2+k$

$A_2 = k(5) = 5k$

Total area $= 2k^2+k+5k = 2k^2+6k$

$= 2k(k+3)$

d.



Shaded Area = Area of big $\square$ − Area of small $\square$

$= k(2k+6) - k(3)$

$= 2k^2+6k-3k$

$= 2k^2+3k$

$= k(2k+3)$

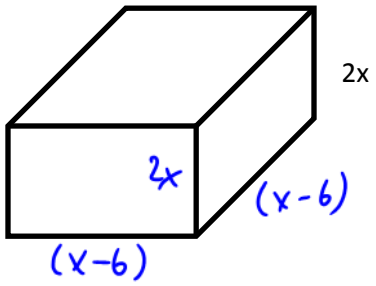
4. The volume of a rectangular prism is represented by the polynomial $2x^3 - 24x^2 + 72x$.

a. Factor the polynomial completely to determine the dimensions of the prism. Remember that $V = lwh$

$2x(x^2 - 12x + 36)$

$= 2x(x-6)(x-6)$

M	A	N
36	-12	-6, -6



b. If x represents 8cm, what are the possible dimensions of the prism?

Length $= x-6 = 8-6 = 2$cm

width $= x-6 = 8-6 = 2$cm

height $= 2x = 2(8) = 16$cm

c. Could x represent 5 cm? Explain.

No, b/c a dimension cannot be a negative value.

5. Write a polynomial with three terms that when factored has a GCF of $3x^4y^2z$.

$9x^4y^2z^2 + 3x^5y^3z + 36xyz$

Answers will vary

6. Determine a possible value of k such that $x^2 + kx - 10$ can be factored as a simple trinomial.

① $k = 1 - 10$
$k = -9$

② $k = -1 + 10$
$k = 9$

M	A	N
-10	k	1, -10 2, -5 -1, 10 -2, 5

③ $k = 2 - 5$
$k = -3$

④ $k = -2 + 5$
$k = 3$