MCR3U – Review Skills
Solution

1a) $3(x+5)-2(x+1)=11$

$3x+15-2x-2=11$

$3x-2x=11-15+2$

$\boxed{x=-2}$

b) $3x^2+12x-15=0$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$=\frac{-12\pm\sqrt{12^2-4(3)(-15)}}{2(3)}$

$=\frac{-12\pm\sqrt{144+180}}{6}$

$=\frac{-12\pm\sqrt{324}}{6}$

$=\frac{-12\pm 18}{6}$

$\boxed{x=1 \text{ or } x=-5}$

or

$3x^2+12x-15=0$

$3(x^2+4x-5)=0$

$3(x+5)(x-1)=0$

$\boxed{\therefore x=-5 \text{ or } x=1}$

c) $\frac{x+2}{x-4}=\frac{3}{1}$

Cross Multiply!

$3(x-4)=1(x+2)$

$3x-12=x+2$

$3x-x=2+12$

$\frac{2x}{2}=\frac{14}{2}$

$\boxed{x=7}$

2. a) $x^2\cdot x^7=x^9$

b) $\frac{x^9}{x^3}=x^6$

c) $(x^4)^6=x^{24}$

d) $(2x)^4=2^4x^4=16x^4$

e) $\left(\frac{2}{x}\right)^3=\frac{2^3}{x^3}=\frac{8}{x^3}$

f) $2^{-4}=\frac{1}{2^4}=\frac{1}{16}$

g) $105^0=1$

h) $-3^2=-(3^2)=-9$

Substitution works well here.

3 a) ① $2x+y=9$
② $3x-2y=17$
Isolate y in ①
③ $y=9-2x$
sub ③ into ②
$3x-2(9-2x)=17$
$3x-18+4x=17$
$7x=17+18$
$\frac{7x}{7}=\frac{35}{7}$
④ $x=5$
sub ④ into ③
$y=9-2(5)$
$y=9-10$
$y=-1$
The POI is $(5,-1)$

Elimination works well here.

b) ① $5x-3y=-7$
② $4x+3y=16$
① + ② $\frac{9x}{9}=\frac{9}{9}$
③ $x=1$
sub ③ into ①
$5(1)-3y=-7$
$-3y=-7-5$
$\frac{-3y}{-3}=\frac{-12}{-3}$
$y=4$
The POI is $(1,4)$

4. a) $y=x^2-6x+4$
$y=x^2-6x+9-9+4$
$y=(x^2-6x+9)-5$
$y=(x-3)^2-5$
$(\frac{b}{2})^2=(\frac{-6}{2})^2=9$
$(\frac{b}{2})=(\frac{-6}{2})=-3$
The vertex is $(3,-5)$

b) $y=2x^2+4x+9$
$y=2(x^2+2x)+9$
$y=2(x^2+2x+1-1)+9$
$y=2(x^2+2x+1)-2+9$
$y=2(x^2+2x+1)+7$
$y=2(x+1)^2+7$
$(\frac{b}{2})^2=(\frac{2}{2})^2=1$
$(\frac{b}{2})=(\frac{2}{2})=1$
The vertex is $(-1,7)$

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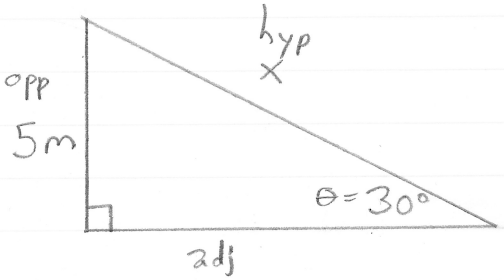
5 a)



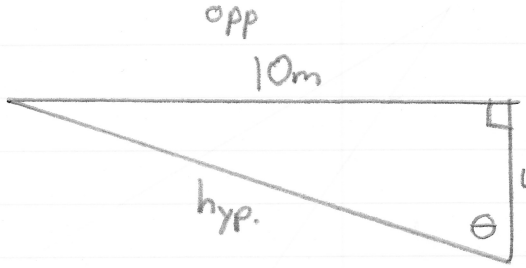
$\sin\theta = \frac{opp}{hyp}$

$\frac{\sin(30°)}{1} = \frac{5}{x}$

$\frac{x\sin(30°)}{\sin(30°)} = \frac{5}{\sin(30°)}$

$x = 10m$

b)



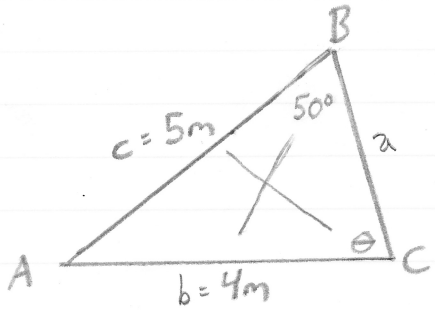
$\tan\theta = \frac{opp}{adj}$

$\tan\theta = \frac{10m}{4m}$

$\theta = \tan^{-1}\left(\frac{10}{4}\right)$

$\theta \cong 68.2°$

c)



Use Sine Law

$\frac{\sin C}{c} = \frac{\sin B}{b}$

$\frac{\sin\theta}{5} = \frac{\sin(50°)}{4}$

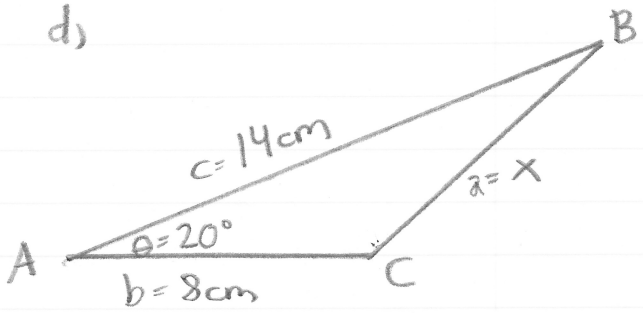
$\frac{4\sin\theta}{4} = \frac{5\sin(50°)}{4}$

$\sin\theta = \frac{5\sin(50°)}{4}$

$\theta = \sin^{-1}\left(\frac{5\sin(50°)}{4}\right)$

$\theta \cong 73.2°$

d)



$a^2 = b^2 + c^2 - 2bc\cos A$

$x^2 = 8^2 + 14^2 - 2(8)(14)\cos(20°)$

$x^2 = 64 + 196 - 210.5$

$\sqrt{x^2} = \sqrt{49.5}$

$x = 7.04\ cm$

6. Graphs → see next page.

MCR3U - Review Skills (Grade 9/10)

1. **Solve each equation for x.**

   a) $3(x + 5) - 2(x + 1) = 11$ b) $3x^2 + 12x - 15 = 0$ c) $\frac{x+2}{x-4} = 3$

2. **Simplify the following exponential expressions.**

   a) $x^2 \bullet x^7$ b) $\frac{x^9}{x^3}$ c) $(x^4)^6$ d) $(2x)^4$

   e) $\left(\frac{2}{x}\right)^3$ f) 2^{-4} g) 105^0 h) -3^2

3. **Use substitution or elimination to solve the linear system (determine the point of intersection).**

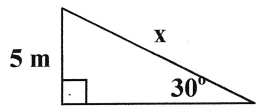
   a) $\begin{array}{l} 2x + y = 9 \\ 3x - 2y = 17 \end{array}$ b) $\begin{array}{l} 5x - 3y = -7 \\ 4x + 3y = 16 \end{array}$

4. **Determine the vertex of each parabola. (Hint: Complete the square.)**

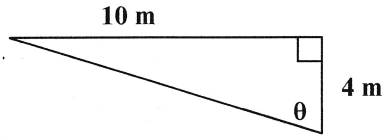
   a) $y = x^2 - 6x + 4$ b) $y = 2x^2 + 4x + 9$

5. **Determine the unknown side length (x) or angle (θ) as indicated.**

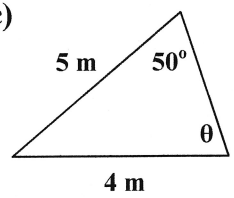
   a)



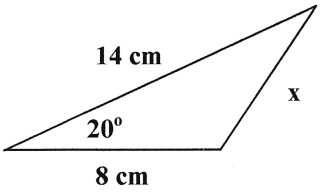
   b)



   c)



   d)

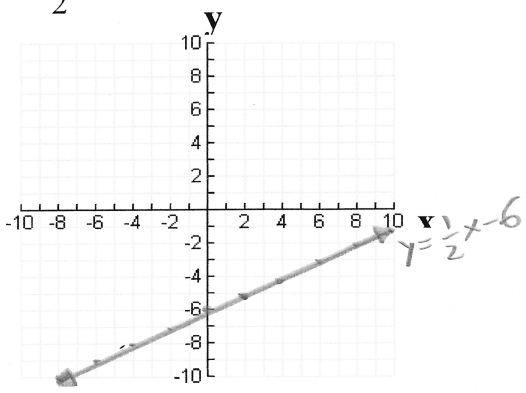


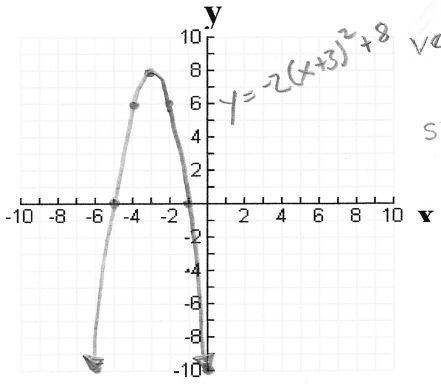
6. **Graph the following:**

   a) $y = \frac{1}{2}x - 6$ b) $y = -2(x+3)^2 + 8$

slope $= \frac{1}{2}$

y-int $= -6$





vertex $(-3, 8)$

step pattern $-2, -6, -10$