Math 2 NCFE Review #1 (Algebra)

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① $3xy(2xy^2 + x^2y^5) - 2x(x^2y^6 + 9y)$

$6x^2y^3 + 3x^3y^6 - 2x^3y^6 - 18xy$

$6x^2y^3 + x^3y^6 - 18xy$

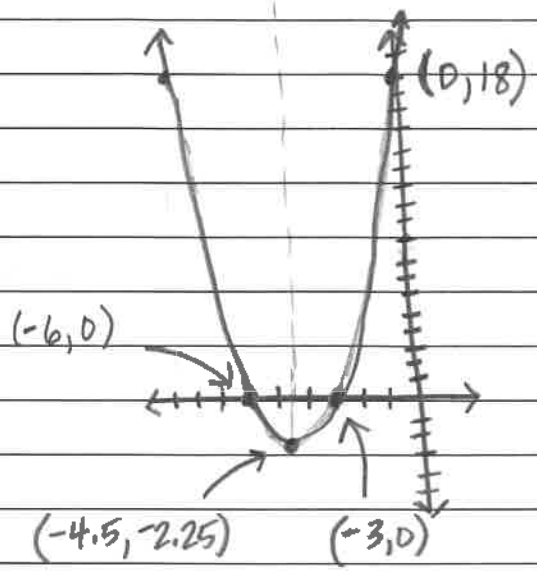
② $x^2 + 9x + 18$

$(x+6)(x+3)$

zeroes $x = -6, x = -3$

vertex $x = \frac{-9}{2(1)} = -4.5$

$(-4.5)^2 + 9(-4.5) + 18 = -2.25$



③ As the water flow increases the time to fill the pool decreases indicating an inverse relationship. Use the model $y = k/x$

$96 \text{ min} = \frac{k}{18 \frac{\text{gallons}}{\text{per min}}}$ $\quad k = 96 \text{ min} * \frac{18 \text{ gallons}}{1 \text{ min}} = 1728 \text{ gallons}$

To fill the pool takes 1728 gallons. If the flow rate is 24 gallons per minute it will take $\frac{1728 \text{ gallons}}{24 \text{ gallons/min}} = 72 \text{ minutes}$

④ As the number of hours worked increases the amount earned increases indicating a direct variation relationship. Use the model $y = kx$

$\$63 = k(6 \text{ hours})$ $\quad k = \$10.50 \text{ per hour}$

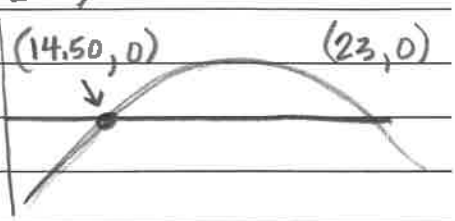
Mary makes $\$10.50$ per hour. If she works 4 additional hours, she will be paid $(\$10.50)(4) = \$42$ more.

⑤ Profit $p(x) = (-55x^2 + 2035x - 16500) - (-27.5x + 1842.5)$

$= -55x^2 + 2062.5x - 18342.5$

Use table, graph or quadratic formula find $p(x) = 0$

Concert breaks even when price is $\$14.50$ OR $\$23$.



Math 2 NCFE Review #2 (Algebra)

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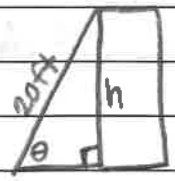
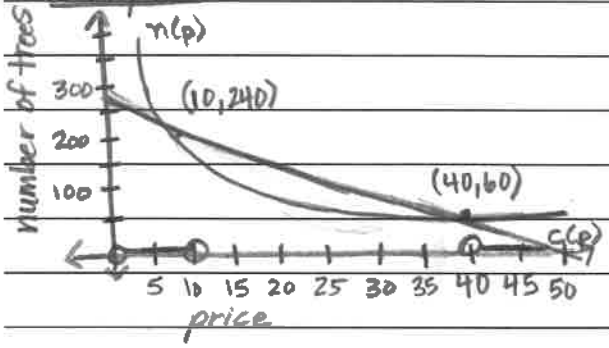
① 

$\sin\theta = \frac{h}{20} \Rightarrow h = 20\sin\theta$

② number of trees that can be bought > number of trees sold

$$\frac{2400}{p} > 300 - 6p$$

Graph



Algebraic

$\frac{2400}{p} > 300 - 6p$

$2400 > 300p - 4p^2$

$4p^2 - 300p + 2400 > 0$

$0 < p < 10$ OR $p > 40$

③ $g = \frac{m_1 m_2}{d^2} \Rightarrow gd^2 = m_1 m_2 \Rightarrow \frac{gd^2}{m_1} = m_2$

④ a) $5x^2 + 12 = 87$

$5x^2 = 75$

$x^2 = 15$

$x = \pm\sqrt{15}$

b) $5 = \frac{70}{x}$

$5x = 70$

$x = 14$

c) $4x^2 + 13x - 7 = 0$

$x = \frac{-13 \pm \sqrt{13^2 - 4(4)(-7)}}{2(4)}$

$x = \frac{-13}{8} \pm \frac{\sqrt{281}}{8}$

$x \approx .47$ or $x \approx -3.72$

⑤ $x^2 - 8x - 2 = 0$

Math 2 NCFE Review #3 (Algebra)

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① Annual Percentage Rate 9.2%

a) Monthly interest rate $(1.092)^{1/12} \approx 1.007$; 0.7%.

b) Weekly interest rate $(1.092)^{1/52} \approx 1.002$; 0.2%.

c) Daily interest rate $(1.092)^{1/365} \approx 1.0002$; 0.02%.

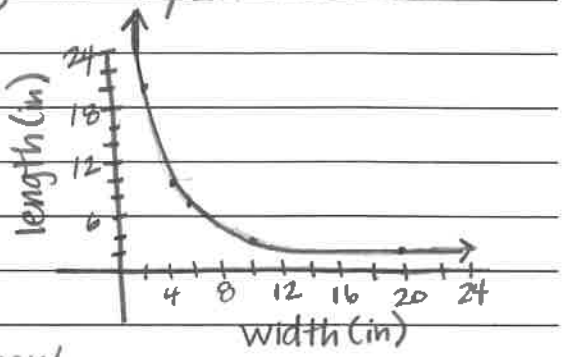
** To check the value take the monthly interest rate and raise it to the 12th power $(1.007)^{12} \approx 1.09$; 9% repeat with others

② 40 in²

$l \cdot w = 40$

$l = \frac{40}{w}$

w	l
2	20
4	10
5	8
10	4



The domain is positive real numbers therefore the graph does not show quadrant 3.

③ $m^4 + 5m^2 + 4 = (m^2)^2 + 5m^2 + 4$

$= (m^2+4)(m^2+1)$

④ Answers may vary. Solutions given must be on the graph of g(x). Some solutions are: (0, -4), (-2, 4), (0, 0)

⑤ $3x - 2 = (x+3)^2 - 1$

$3x - 2 = x^2 + 6x + 8$

$0 = x^2 + 3x + 10$

$x = \frac{-3 \pm \sqrt{9 - 4(1)(10)}}{2}$

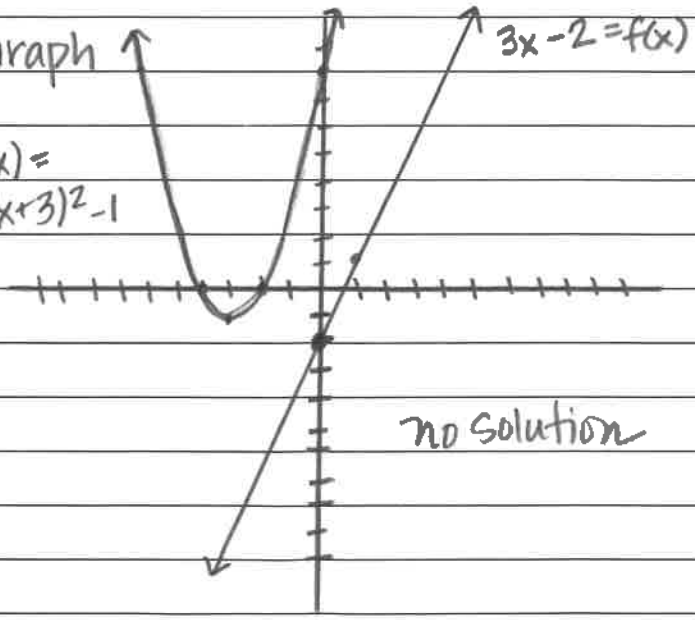
$x = \frac{-3 \pm \sqrt{-31}}{2}$

$x = -1.5 \pm \frac{\sqrt{-31}}{2}$

no real solution

Graph

$g(x) = (x+3)^2 - 1$



Math 2 NCFE #4 Functions

① $f(x) = 5x^2 + kx + 2$

$f(3) = 5(3)^2 + k(3) + 2 = 23$

$45 + 3k + 2 = 23$

$3k = -24$

$k = -8$

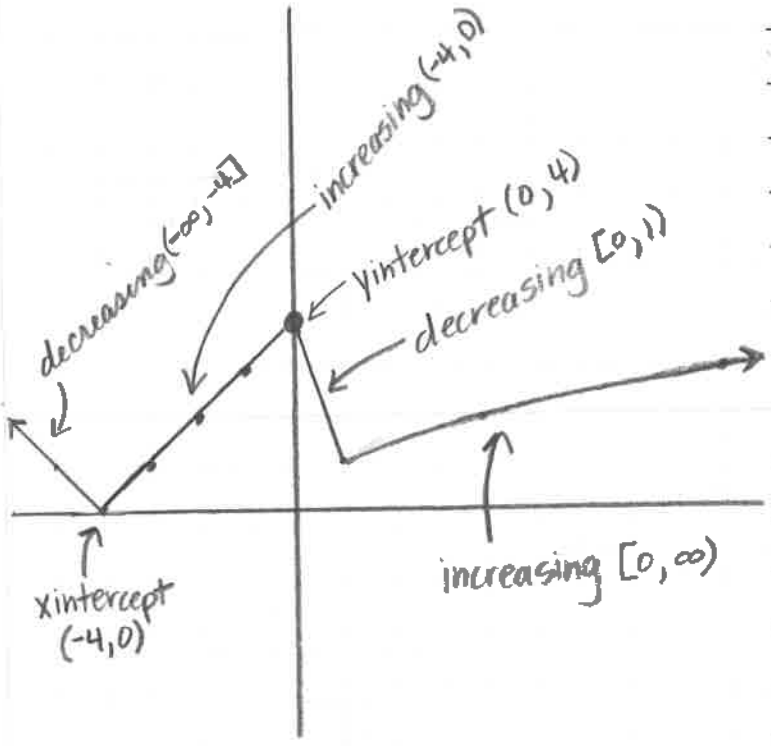
② The car's distance didn't change between 15 seconds and 35 seconds. It was stationary for 20 seconds.

③

10
9
8
7
6
5
4
3
2
1
−1
−2

The domain is $\{-2, -1, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

④



⑤ $\frac{1}{2}x^2 + 3x + 4$

$\frac{1}{2}(x^2 + 6x + 8)$

$\frac{1}{2}(x+4)(x+2)$

Base of triangle $x+4$
Height of triangle $x+2$

OR

Base of triangle $x+2$
Height of triangle $x+4$

Math 2 NCFE Review #5 (Functions)

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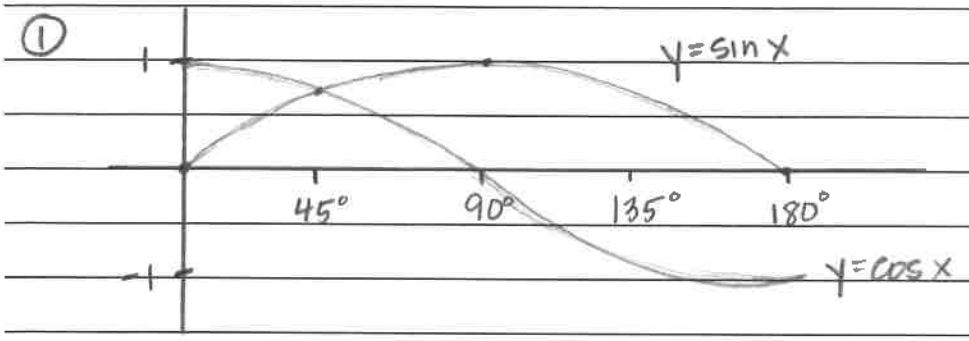
① 

$y=\sin x$ increases $[0, 90°]$ and decreases $(90°, 180°]$

$y=\cos x$ decreases $[0, 180°]$ and has an x intercept $(90°, 0)$

They both have a maximum y value of 1.

② Graph axis of symmetry is $x=-2$

The equation $2x(x-6)-11 = y+3x^2$

$2x^2-12x-11 = y+3x^2$

$-x^2-12x-11 = y$

axis of symmetry $x = \frac{12}{-2} = -6$

The distance between $x=-2$ and $x=-6$ is 4.

③ $NEXT = NOW * (1.012)^{24}$

$NEXT = NOW * 1.331$ starting at 2000

④ $I(p) = -0.8x^2 - 1360x - 240$ $\quad C(p) = 0.5x^2 - 6x + 200$

$Profit(p) = (-0.8x^2 - 1360x - 240) - (0.5x^2 - 6x + 200)$

$= -1.3x^2 - 1354x - 440$

⑤ $A = \pi r^2$

$A = \pi(70t-5)^2$ ← Students may leave in this form.

$A = \pi(4900t^2 - 700t + 25)$

$A = 4900\pi t^2 - 700\pi t + 25\pi$

Math 2 NCFE Review #6 (Functions)

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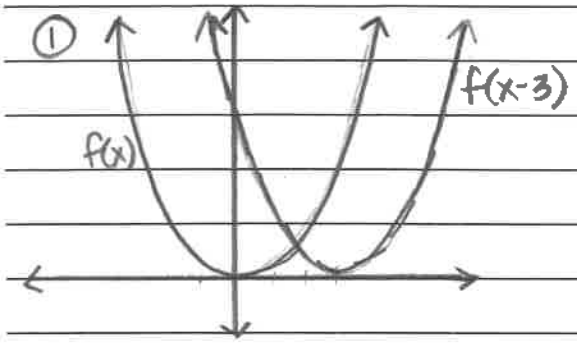
① 

The graph of $f(x-3)$ is $f(x)$ translated to the right 3 units.

② $g(x) = f(x+2)$

$h(x) = f(x+2-2) + 3$

$= f(x) + 3$ (c)

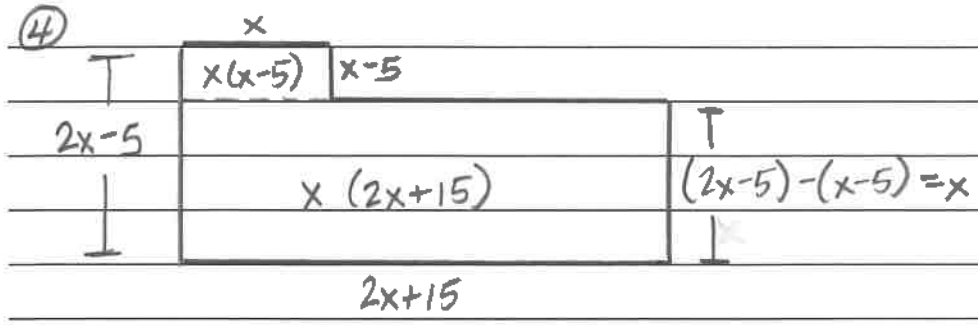
③ $h(t) = -(4t-12)(4t-36)$

$4t-12=0$ $\quad$ $4t-36=0$

$t=3$ $\quad$ $t=9$

The maximum height occurs at $t=6$ and the rocket hits the ground at $t=9$ so it took 3 seconds after reaching maximum height to hit the ground.

④



Area $= x(x-5) + x(2x+15)$

$= x^2 - 5x + 2x^2 + 15x$

$= 3x^2 + 10x$

⑤ a) neither

b) even

c) neither

d) odd

Math 2 NCFE Review #7 (Geometry)

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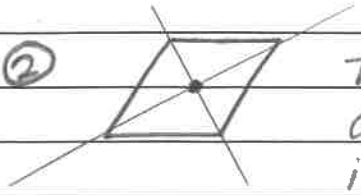
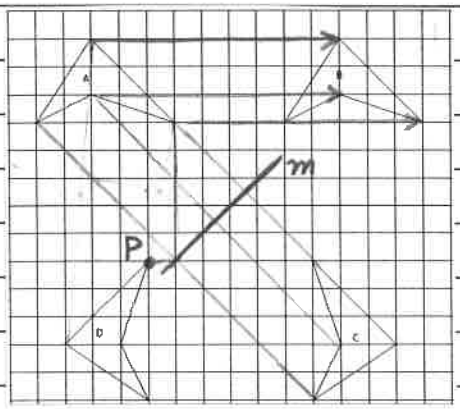
① This transformation is a dilation with both coordinates being multiplied by 2. The shape will still be a square so all angles are right angles. The perimeter of the new square will be twice the original square and the area will be 4 times as large.

② 

The figure has two lines of reflections and a 180° rotation that will carry it onto itself.

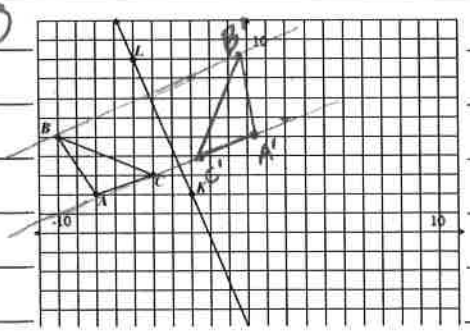
③ 

A to B is a translation 9 units to the right.

A to C is a reflection across Line m

A to D is a translation to the left 1 unit, down 5 units and followed by a 90° counterclockwise rotation centered at point P.

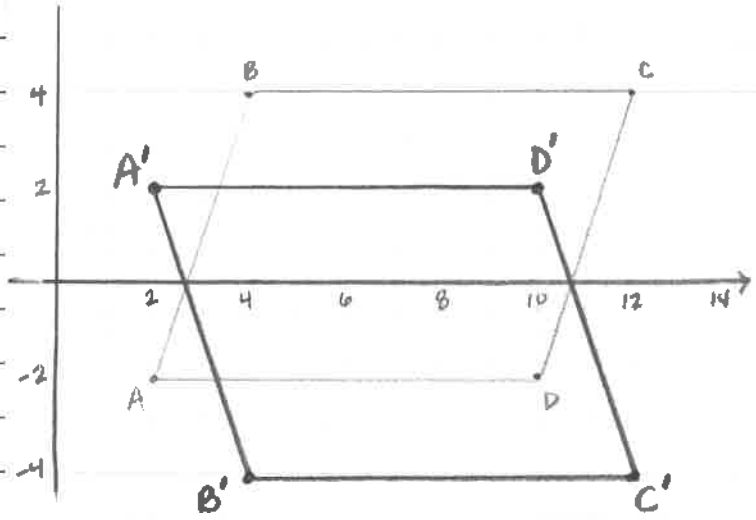
*note: there are other transformations that will map these.

④ 

Slope of $\overline{LK}$ is $-7/3$

Slope of line perpendicular is $3/7$

⑤ Reflection is a rigid transformation so lengths, perimeter, area, and angle measures will not change but stay the same.



Math 2 NCFE Review #8 (Geometry)

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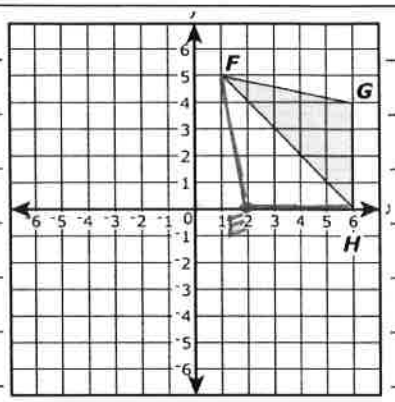
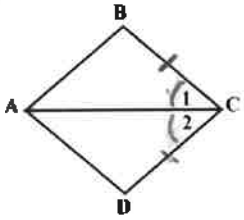
① 

Point E (2, 0)

② The dilation is not a rigid transformation. It will change the size of the ΔWXY by a scale factor of 3.

③ 

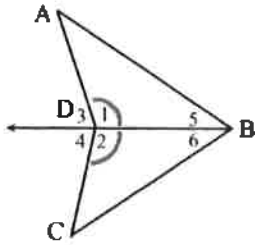
Given: $\overline{BC} \cong \overline{CD}$

$\overline{AC}$ bisects $\angle BCD$

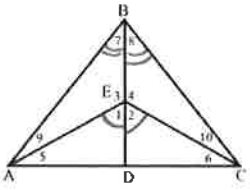
Prove: $\Delta ABC \cong \Delta ADC$

$\overline{BC} \cong \overline{CD}$ is given. Since $\overline{AC}$ bisects $\angle BCD$ then $\angle 1 \cong \angle 2$ by definition of bisector. $\overline{AC} \cong \overline{AC}$ by the Reflexive Property. Therefore $\Delta ABC \cong \Delta ADC$ by Side-Angle-Side Congruency Theorem.

④ Given that $\angle 1 \cong \angle 2$ what additional information would be needed to prove $\Delta ABD \cong \Delta CBD$ by Angle-Side-Angle Theorem.



You need $\angle 5 \cong \angle 6$ which means $\overrightarrow{BD}$ bisects $\angle ABC$.

⑤ 

Given: $\angle 1 \cong \angle 2$

$\angle 7 \cong \angle 8$

Prove: $\angle 5 \cong \angle 6$

Plan for proof:

$\angle 3 \cong \angle 4$ since they are supplementary to $\angle 1$ and $\angle 2$ respectively and $\angle 1 \cong \angle 2$. $\overline{BE} \cong \overline{BE}$ (Reflexive Property) so $\Delta BEA \cong \Delta BEC$ by ASA $\cong$ Theorem. This means $\overline{BA} \cong \overline{BC}$ by Corresponding Parts of Congruent Triangles are congruent. Now, we know ΔABC is isosceles making $\angle A \cong \angle C$. Since $\angle 9 \cong \angle 10$ by CPCTC then $\angle 5 \cong \angle 6$ because $m\angle A = m\angle 9 + m\angle 5$ and $m\angle C = m\angle 10 + m\angle 6$ so $m\angle 9 + m\angle 5 = m\angle 10 + m\angle 6 \rightarrow m\angle 5 = m\angle 6 \rightarrow \angle 5 \cong \angle 6$.

Math 2 NCFE Review #9 (Geometry)

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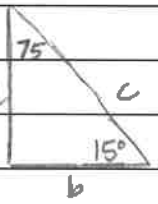
① $\sin\theta = \cos 15°$

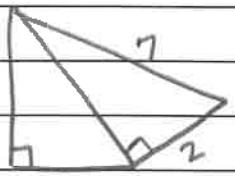
$\sin 75° = \cos 15°$



$\cos 15° = b/c$

$\sin\theta = b/c$

$\theta = 75°$

② 

$\sqrt{7^2 - 2^2} = \sqrt{49-4} = \sqrt{45} = \sqrt{9}\cdot\sqrt{5} = 3\sqrt{5}$

$x^2 + 5^2 = (\sqrt{45})^2$

$x^2 + 25 = 45$

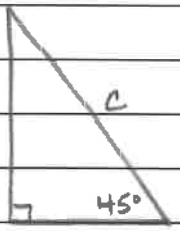
$x^2 = 20$

$x = \sqrt{20} = 2\sqrt{5}$

Perimeter

$5 + 2\sqrt{5} + 2 + 7$

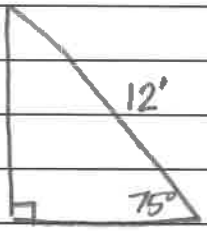
$14 + 2\sqrt{5}$

③ 

$\sin 45° = \frac{145}{c}$

$c = \frac{145}{\sin 45°} \approx 205$ ft.

Length of wire is 205 ft.

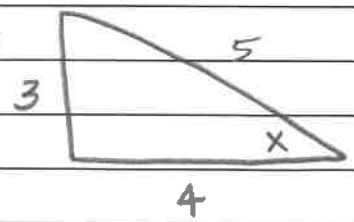
④ 

$\sin 75° = \frac{b}{12}$

$b = 12\sin 75°$

$b \approx 11.6'$

The ladder can safely reach 11.6' up the wall.

⑤ 

$\sin x = \frac{3}{5}$

$\cos x = \frac{4}{5}$

$\tan x = \frac{3}{4}$

Math 2 NCFE Review #10 (Geometry)

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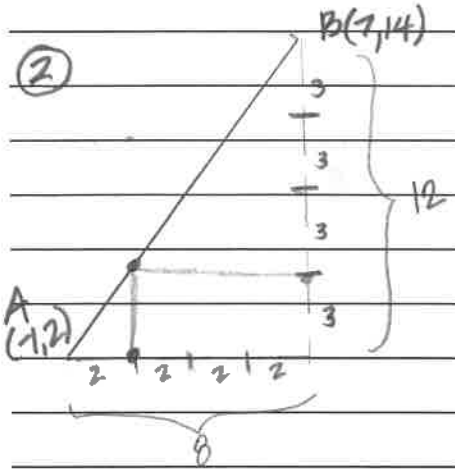
① $(x-1)^2 + (y-4)^2 = 25$

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

$1 + 4 = 5 \neq 25$

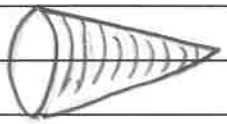
No, (2,2) is not on the circle.

②



$P(-1+2, 2+3) = (1,5)$

③



Cone

④ 72 in = 6 ft

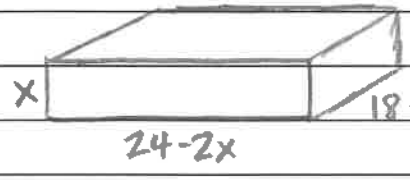
84 in = 7 ft

9.5 in = $9.5/12$ ft

Volume of waterbed is $(6)(7)(9.5/12) = 31.5\ ft^3$

$\frac{2071\ lbs}{31.5\ ft^3} \approx 65.7$ lbs per cubic foot

⑤



$V(x) = x(24-2x)(18-2x)$

Using a graphing calculator

$x = 3.4$ $V(3.4) = 655$

cut out squares with side length 3.4 inches

** note: This creates a cubic polynomial which is better aligned with Math 3 than Math 2.

Math 2 NCFE Review #11 (Probability)

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①

	Droid 25%	iPhone 75%
Verizon 60%	.15	.45
Sprint 40%	.10	.30

There is a 15% chance Andrea will get an Android phone with Verizon.

② $P(\text{red} \mid \text{bottle 1}) = \frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$

$P(\text{red} \mid \text{bottle 2}) = \frac{1}{2} \cdot 1 = \frac{1}{2}$

③

	Made an A	Didn't make an A	Total
boy	5	13	18
girl	7	7	14
Total	12	20	32

$P(\text{girl}) = \frac{14}{32}$ $P(A) = \frac{12}{32}$ $P(\text{girl and } A) = \frac{7}{32}$

$P(\text{girl OR } A) = \frac{14}{32} + \frac{12}{32} - \frac{7}{32} = \frac{19}{32}$ OR 59.4% chance

④ $P(\text{red}) = \frac{2}{9}$ $P(\text{blue}) = \frac{3}{9}$ $P(\text{red and blue}) = \frac{2}{9} \cdot \frac{3}{9} = \frac{6}{81}$

⑤

	IceCream	Cake	Total
Male	75	20	95
Female	10	50	60
Total	85	70	155

$P(\text{male}) = 95/155 \approx .613$

$P(\text{male} \mid \text{cake}) = 20/70 \approx .286$

$P(\text{male} \mid \text{icecream}) = 75/85 \approx .882$

No Independent Events

$P(\text{female}) = 60/155 \approx .387$

$P(\text{female} \mid \text{cake}) = 50/70 \approx .714$

$P(\text{female} \mid \text{icecream}) = 10/85 \approx .118$

$P(\text{cake}) = 70/155 \approx .452$

$P(\text{cake} \mid \text{male}) = 20/95 \approx .211$

$P(\text{cake} \mid \text{female}) = 50/60 \approx .833$

$P(\text{icecream}) = 85/155$

$P(i \mid m) = 75/95$

$P(i \mid f) = 10/60$