

Mathematics 1:

$$1) \frac{x+1}{2} = 4+6, \frac{x-2}{3} = \frac{2-4}{5}$$

$$x+1 = 24+12, 5x-10 = 6-34$$

$$x-24 = 11, 5x+34 = 16$$

$$x-24 = 11 \quad \times 5 \Rightarrow 5x - 64 = 33$$

$$5x+34 = 16 \quad \times 2 \quad \underline{100x+64 = 32}$$

$$13x = 65$$

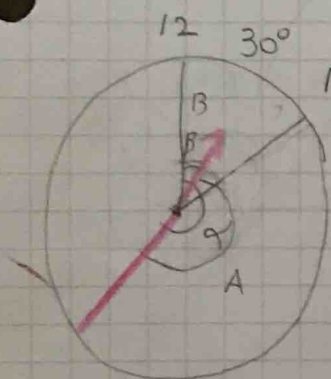
$$x = 5$$

$$5 - 24 = 11$$

$$24 = -6$$

$$4 = -3$$

$$x = 5, y = -3$$



Little hand moves as big hand moves

$$\frac{360}{12} = 30^\circ \text{ for 5 mins}$$

\therefore hour hand moves 30° every time minute hand moves 5 mins

$\therefore 6^\circ$ for 1 min \therefore hour hand moves 6° every minute

$$\frac{B}{30} = \frac{\alpha}{360} \quad (1) \quad \text{also } \alpha - B = 231 \quad (2)$$

$$360B = 30\alpha$$

$$12B = \alpha \quad (1)$$

$$12B - B = 231$$

$$11B = 231$$

$$B = 21^\circ$$

$$\alpha = 12(21^\circ) = 252^\circ$$

252 ~~mins~~ in total

$$6 \overline{) 252}$$

$$12:42$$

$$B = 21^\circ$$

$$A - B = 231$$

$$360B = 30A$$

$$3) 11 \times 11 \times 2^2 = 11^2 \times 2^2 = 2^2 \times 11^2$$

square number
you can take
root

$$\sqrt{11^2 \times 2^2} = 11 \times 2^2 = 11(4) = 44$$

$$b) 11^2 \times 2^2 \times 11 = 11^3 \times 2^2$$

$$11^2 \times 2^2 = 4 \times 121 =$$

c) has to both be to the power 6

$$2^2 \times 11^5 \times 11 = 2^6 \times 11^6$$

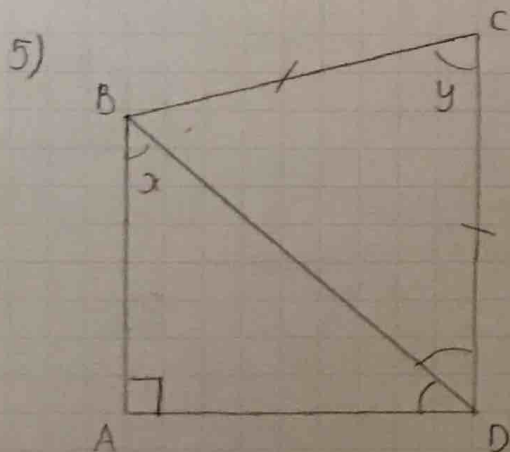
$$2^2 \times 11^5 = 4 \times 11^5$$

$$4) a) P = \frac{4(2.3)^2(15.6)}{0.7^2} = \frac{330.096}{0.7^2} = 673.665$$

$$b) 40.8 = \frac{4(3.5)^2 L}{1.2^2} \Rightarrow 4(3.5)^2 L = 58.752 \Rightarrow L = 1.199$$

$$c) 7.5 = \frac{4I^2(4.6)}{1.4^2} \Rightarrow 4I^2(4.6) = 14.7 \Rightarrow I^2 = 0.7989130435 \Rightarrow I = 0.894$$

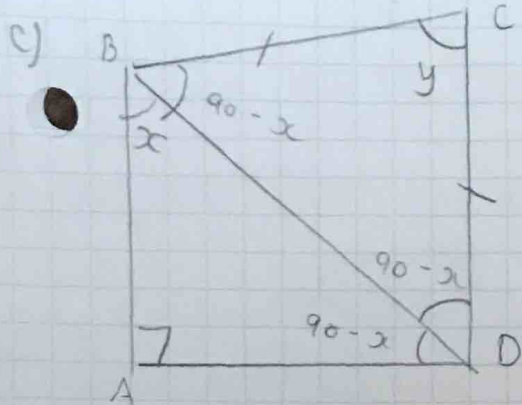
$$d) 79.1 = \frac{4(4.8)^2(10.9)}{D^2} \Rightarrow 79.1 D^2 = 4(4.8)^2(10.9) \Rightarrow D = 3.504$$



a) i) if $x = 60^\circ$
 $\angle BDA = 30^\circ$
 $\angle BDC = 30^\circ$ and $\angle CBD = 30^\circ$ since $\triangle CBD$ isosceles
 $180 - 60 = 120^\circ$

ii) if $y = 25^\circ$
 $\angle CBD = \angle CDB = 77.5^\circ$
 $\angle ADB = 77.5^\circ$ also
 $\angle x = 180 - 77.5 - 90 = 12.5^\circ$

b) $y = 2x$, y is twice the value of x

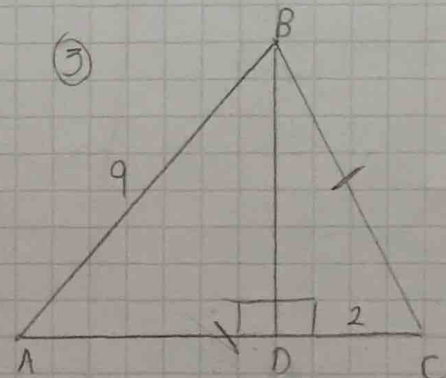
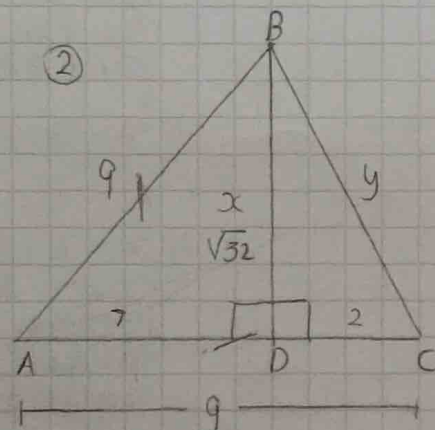
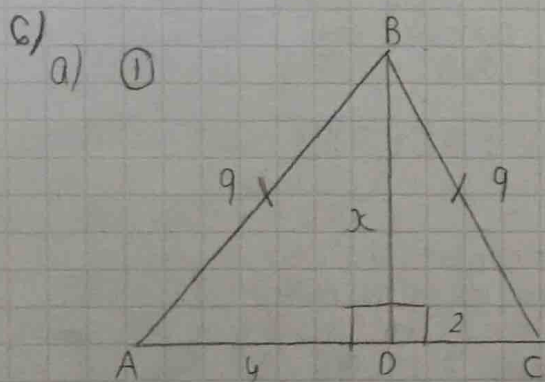


$$\angle BDA = 180 - 90 - x = 90 - x$$

$$\therefore \angle BDC = 90 - x$$

$$\Rightarrow \angle CBD = 90 - x$$

$$\therefore \angle BCD = y = 180 - (90 - x + 90 - x) = 180 - (180 - 2x) = 2x$$



b) ① $x^2 + 2^2 = 9^2$
 $x^2 = 81 - 4$
 $x^2 = 77$
 $x = \sqrt{77}$

$$\sqrt{77}^2 + y^2 = 9^2$$

$$y^2 = 81 - 77$$

$$y^2 = 4$$

$$y = 2$$

$$\text{perimeter} = 9 + 9 + 4 = 22$$

$$\text{Area} = \frac{1}{2} (4)(\sqrt{77})$$

$$= 2\sqrt{77}$$

$$= 17.55$$

② $7^2 + x^2 = 9^2$
 $x^2 = \sqrt{32}$
 $x = \sqrt{32}$

$$2^2 + \sqrt{32}^2 = y^2$$

$$y^2 = 32 + 4$$

$$y^2 = 36$$

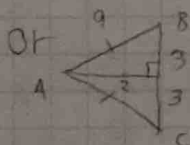
$$y = 6$$

$$\text{perimeter} = 9 + 9 + 6 = 24$$

$$\text{Area} = \frac{1}{2} (9)(\sqrt{32})$$

$$= 25.456$$

③ can't find area or perimeter



$$\text{Area} = 9^2 = 2^2 + 3^2$$

$$2^2 = 81 - 9 = 72 \Rightarrow 2 = 8.48 \therefore \text{Area} = \frac{1}{2} (6)(8.48) = 25.456$$

$$7) y = \frac{160}{\pi x} - x$$

a) When $x=4$, $y = \frac{160}{\pi(4)} - 4 = \frac{40}{\pi} - 4 = 8.73$

b) When $x=1.5$, $y = \frac{160}{\pi(1.5)} - 1.5 = 32.45$

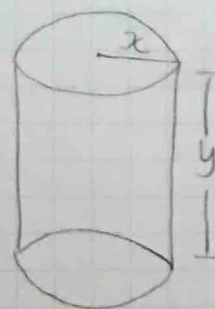
$x=2$, $y = \frac{160}{\pi(2)} - 2 = 23.46$

$x=3$, $y = \frac{160}{\pi(3)} - 3 = 13.98$

$x=5$, $y = \frac{160}{\pi(5)} - 5 = 5.19$

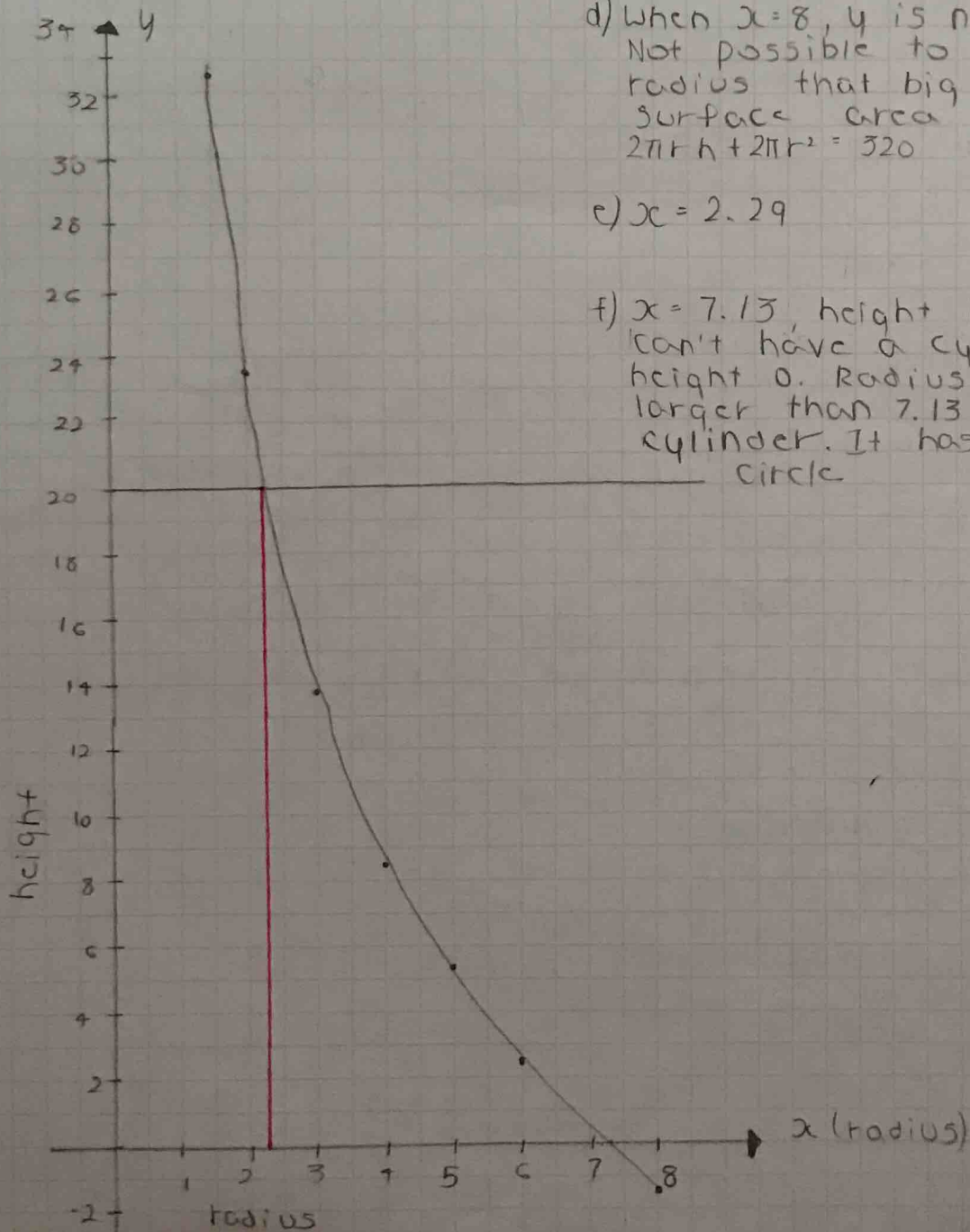
$x=6$, $y = \frac{160}{\pi(6)} - 6 = 2.49$

$x=8$, $y = \frac{160}{\pi(8)} - 8 = -1.63$



Surface area = 320 cm^2

c)



d) When $x=8$, y is negative. Not possible to have a radius that big and have surface area of 320 cm^2 .
 $2\pi r h + 2\pi r^2 = 320$

e) $x = 2.29$

f) $x = 7.13$, height is 0. You can't have a cylinder with height 0. Radius must be larger than 7.13 to be a cylinder. It has become a circle.

8)

$$a) I: \frac{1}{4}(100\pi) = 25\pi$$

$$I \ \& \ II: \frac{1}{4}\pi R^2 - \Rightarrow II = \frac{1}{4}\pi R^2 - 25\pi$$

$$\frac{1}{4}\pi R^2 - 25\pi = 25\pi$$

$$\frac{1}{4}\pi R^2 = 50\pi$$

$$R^2 = 200$$

$$R = \sqrt{200} = 14.142$$

$$b) I: \frac{1}{4}(2)(\pi)(10) + 10 + 10 = 5\pi + 20$$

$$II: \frac{1}{4}(2\pi)(R) + (R-10) + (R-10) = \frac{1}{2}\pi R + 2R - 20 + 5\pi$$

$$5\pi + 20 = \frac{1}{2}\pi R + 2R - 20 + 5\pi$$

$$5\pi + 40 = \frac{1}{2}\pi R + 2R + 5\pi$$

$$40 = \frac{1}{2}\pi R + 2R$$

$$80 = \pi R + 4R$$

$$R(\pi + 4) = 80$$

$$R = \frac{80}{\pi + 4} = 11.20$$

9)

$$a) 10 + 11 + 12 + 13 + 14 + 15 + 16 = 27 + 64$$

b)

$$\text{Row 3: } 5 + 6 + 7 + 8 + 9 = 8 + 27$$

$$\begin{array}{ccccccc} & \downarrow & & \downarrow & \downarrow & \downarrow & \\ & 2^2+1 & & 3^2 & 2^3 & 3^3 & \end{array}$$

$$\text{Row 4: } 10 + 11 + 12 + 13 + 14 + 15 + 16 = 27 + 64$$

$$\begin{array}{ccccccc} & \downarrow & & & \downarrow & \downarrow & \downarrow \\ & 3^2+1 & & & 4^2 & 3^3 & 4^3 \end{array}$$

$$\text{Row 2: } 2 + 3 + 4 = 1 + 8$$

$$\begin{array}{cccc} & \downarrow & \downarrow & \downarrow + \downarrow \\ & 1^2+1 & 2^2 & 1^3 & 2^3 \end{array}$$

$$i) A + \dots + B = C + D$$

$$\begin{array}{cccc} \downarrow & & \downarrow & \downarrow & \downarrow \\ (\sqrt{B}-1)^2+1 & & \sqrt{B}^2 & (\sqrt{B}-1)^3 & \sqrt{B}^3 \end{array}$$

$$B = 8 + 1 = 29^2$$

$$\sqrt{B} = 29$$

$$A = 785, C = 21952, D = 24389$$

$$A = 1090 = 33^2 + 1 = 1090$$

$$B = 34^2 = 1156$$

$$C = 33^3 = 35937$$

$$D = 34^3 = 39304$$

$$\text{ii) } C = 3375 = 15^3$$

$$A = 15^2 + 1 = 226$$

$$B = 256$$

$$D = 4096$$

$$\text{iv) } D = 59319 = 39^3$$

$$A = (38)^2 + 1 = 1445$$

$$B = 39^2 = 1521$$

$$C = 38^3 = 54872$$

$$\text{Q) Row } n: (n-1)^2 + 1 + \dots + n^2 = (n-1)^3 + n^3$$