Math 7 Fall 2014 Final Answers

$T_n = \frac{8n+4}{3n-1}$

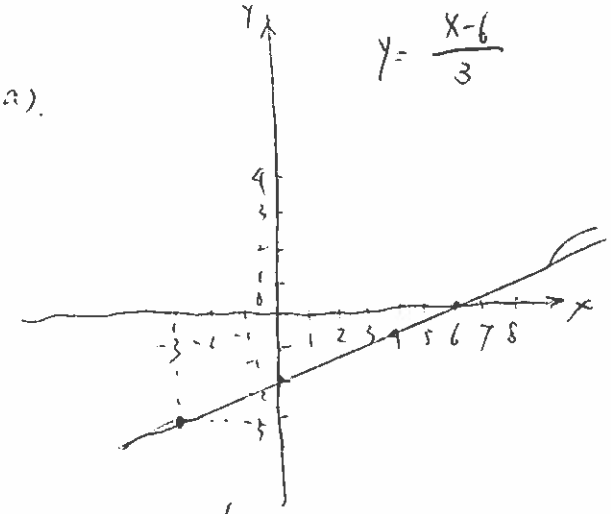
a) $T_p = \frac{8p+4}{3p-1} = \frac{7}{2}$

$16p + 8 = 21p - 7 \quad 5p = 15$

$p = 3$

b) $T_9 = \frac{8\cdot 9+4}{3\cdot 9-1} = \frac{72+4}{27-1} = \frac{76}{26} = \frac{38}{13}$

a). $y = \frac{x-6}{3}$



$x = 0 \quad y = \frac{-6}{3} = -2$

$y = 0 \quad x = 6$

b) x-intercept $y = 0 \quad x = 6$

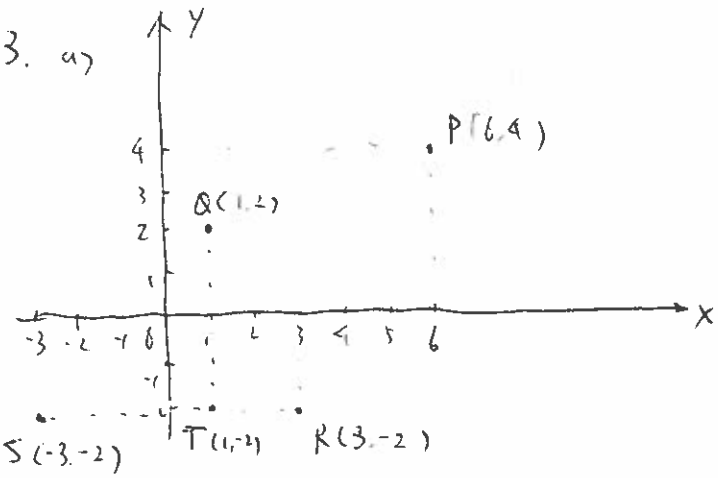
y-intercept $x = 0, \quad y = -2$

c) $(-3, -3)$ or $x = y$

$y = \frac{x-6}{3} = \frac{y-6}{3} \quad 3y = y - 6$

$2y = -6 \quad y = -3, \quad x = -3$

3. a)



b) $S_{PQ} = \frac{y_Q - y_P}{x_Q - x_P} = \frac{2-4}{1-6} = \frac{-2}{-5} = \frac{2}{5}$

$S_{PR} = \frac{y_R - y_P}{x_R - x_P} = \frac{-2-4}{3-6} = \frac{-6}{-3} = 2$

$S_{QR} = \frac{y_R - y_Q}{x_R - x_Q} = \frac{-2-2}{3-1} = \frac{-4}{2} = -2$

c). $S(-3, -2)$

d) $T(1, -2)$

4. a) $\frac{x-4}{3} + \frac{2x-5}{5} > x - \frac{3x-8}{4}$

$\frac{5x-20+6x-15}{15} > \frac{4x-3x+8}{4}$

$\frac{11x-35}{15} > \frac{x+8}{4}$

$44x - 140 > 15x + 120$

$29x > 260 \quad x > \frac{260}{29}$

4.(b) $3 - \frac{X-1}{4} < \frac{7X+5}{3}$

$\frac{12 - X + 4}{4} < \frac{7X+5}{3}$

$\frac{-X+16}{4} < \frac{7X+5}{3}$

$-3X + 48 < 28X + 20$

$-31X < -28$

$X > \frac{28}{31}$

(c) $\frac{10-X}{7} < 4 - \frac{8X+9}{2}$

$\frac{10-X}{7} < \frac{8-8X-9}{2}$

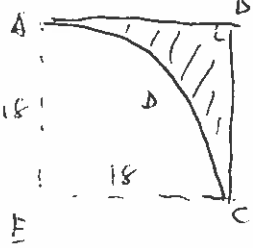
$\frac{10-X}{7} < \frac{-8X-1}{2}$

$20 - 2X < -56X - 7$

$54X < -27$

$X < -\frac{27}{54} = -\frac{9}{18} = -\frac{1}{2}$

5 a).



Perimeter = AB + BC + $\overset{\frown}{ADC}$

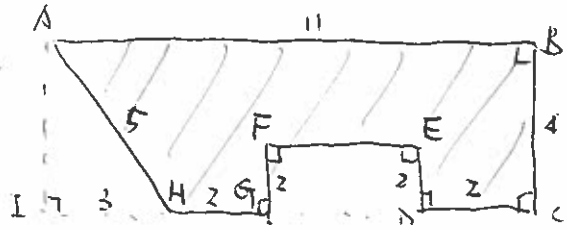
$= 18 + 18 + \frac{1}{4} \times 2\pi \times 18$

$= 36 + 9\pi$ cm

Area = Area of Square $- \frac{1}{4}$ Area of circle

Area $= 18 \times 18 - \frac{1}{4}\pi 18^2 = 324 - 81\pi$ cm^2

(b)



Perimeter = AB + BC + CD + DE + EF + FG + GH + HA

$= 11 + 4 + 2 + 2 + (11 - 2 - 2 - 3) + 2 + 2 + 5$

$= 32$ cm

Area = Area ABCI − Area ΔAHI − Area □DEFG

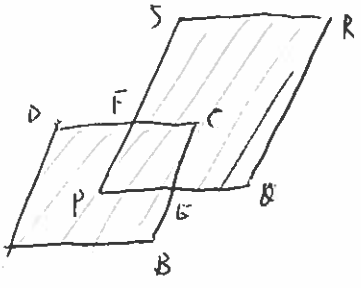
$= 11 \times 4 - \frac{1}{2} \times 3 \times 4 - 2 \times (11 - 2 - 2 - 3)$

$= 44 - 6 - 8 = 30$ cm^2

6. a) $A_{ABCD} = 180$ cm^2

$A_{PECF} = \frac{1}{4} A_{ABCD}$

$= \frac{1}{4} \cdot 180 = 45$ cm^2



$A_{PQRS} = 6 \cdot A_{PECF} = 6 \cdot 45 = 270$ cm^2

Total Area = $A_{PQRS} + A_{ABCD} - A_{PECF}$

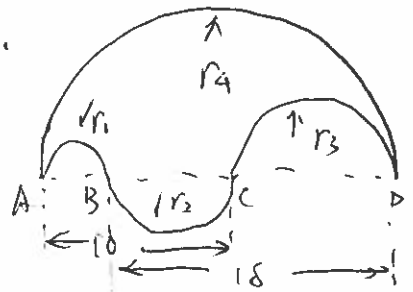
$= 270 + 180 - 45 = 405$ cm^2

b) if AB = 15cm, height from D to AB is h

$h \times 18 = A_{ABCD} = 180$

$h = \frac{180}{18} = 10$ cm

7.



Denote each radius as r_1, r_2, r_3, r_4

, $2r_1+2r_2=16 \quad r_1+r_2=5$

$2r_2+2r_3=18 \quad r_2+r_3=9$

$r_4=\frac{2r_1+2r_2+2r_3}{2}=r_1+r_2+r_3$

$r_4-r_3=r_1+r_2=5$

$\text{Area}=\frac{1}{2}\pi r_4^2-\frac{1}{2}\pi r_3^2+\frac{1}{2}\pi r_2^2-\frac{1}{2}\pi r_1^2$

$=\frac{\pi}{2}(r_4^2-r_3^2+r_2^2-r_1^2)$

$=\frac{\pi}{2}[(r_4-r_3)(r_4+r_3)+(r_2-r_1)(r_1+r_2)]$

$=\frac{\pi}{2}[5(r_4+r_3)+5(r_2-r_1)]$

$=\frac{5\pi}{2}(r_4+r_3+r_3+r_2-r_1)$

$=\frac{5\pi}{2}[\frac{1}{2}(r_2+r_3)]=5\pi\cdot 9=45\pi \text{ cm}^2$

b) Perimeter: can't do it as we don't really know r_1, r_2, r_3, and r_4

8. a. Volume = Base Area × Height

$=\frac{1}{2}\cdot 16\cdot 15\cdot 25=3000 \text{ cm}^3$

Total Surface Area = 2 · Base Area + Perimeter × Height

$=2\cdot\frac{1}{2}\cdot 16\cdot 15+(17+17+16)\cdot 25$

$=240+1250=1490 \text{ cm}^2$

b) Sum of two small prisms surface Area = Total Area of original prism + 2 · Base Area

$=1490+\frac{3}{2}\cdot 16\cdot 15=1490+240$

$=1730 \text{ cm}^2$

c) Change rate $=\frac{1730-1490}{1490}=\frac{240}{1490}=16.1\%$

9. a) $V=V_{\text{big cube}}+V_{\text{small cube}}$

$=5^3+2^3=125+8=133 \text{ cm}^3$

b) Total Surface Area =
Total surface Area of big cube
+ 4 faces of small cube

$=6\times 5^2+4\cdot 2^2=6\times 25+4\times 4$

$=150+16=166 \text{ cm}^2$

10. The solid is made up from subtracting two small triangular prisms and one small rectangular prism from a large rectangular prism.

$V_{\text{large Rec prism}}=6\times 7\times 12=504 \text{ m}^3$

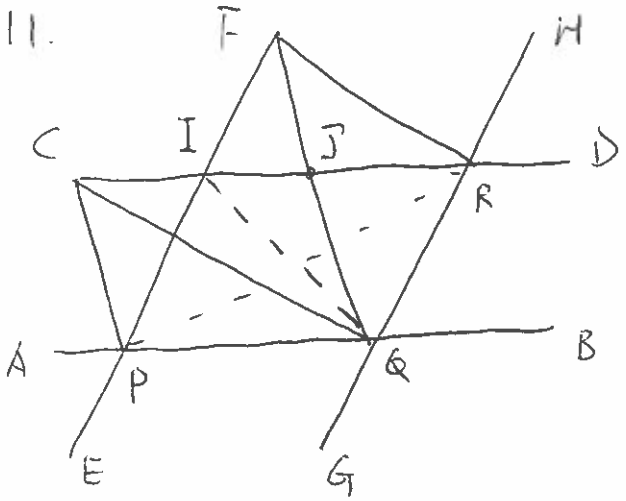
$V_{\text{small rec prism}}=2\times 1\times 12=24 \text{ m}^3$

$V_{\text{left triangular prism}}=\frac{1}{2}\cdot 2\cdot 3\times 3=9 \text{ m}^3$

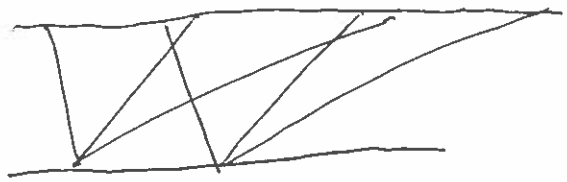
$V_{\text{right triangular prism}}=\frac{1}{2}\cdot 2\times 3\times 4=12 \text{ m}^3$

$V_{\text{solid}}=504-24-9-12=459 \text{ m}^3$

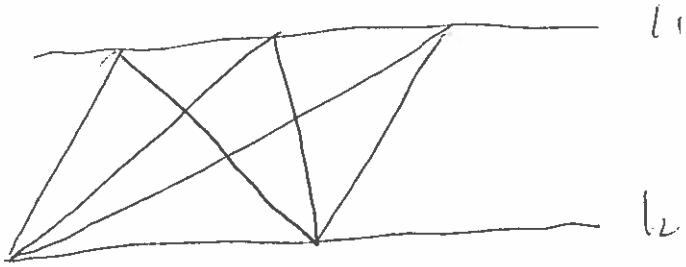
11.



Note. the following parallelograms all have the same area. because they have same base + height



Similarly, the following triangles all have the same area for the same reason if l_1 is parallel to l_2



We added a line IQ.

$A_{\triangle QRF} = A_{\triangle QIR}$ ($\triangle$ w/ same base height)

$= \frac{1}{2} A_{\square QRIP}$

$= \frac{1}{2} A_{\square QJCP}$ ($\square$ w/ same base + height)

$= A_{\triangle PCQ}$

Solution 2.

We add line PR.

$A_{\triangle QRF} = A_{\triangle QRP}$ (same base)

$= A_{\triangle QPC}$ (same base)