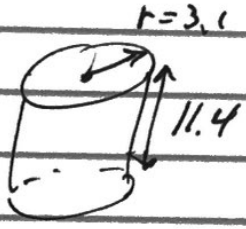
Solutions
Dr Hudson / BECA
IB Mathematics Applications
1 December 2020

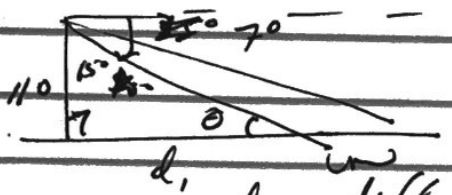
Final Exam

1) a) $V = \pi (3.1)^2 (11.4)$
$= 344.174...$
$\approx 344 \text{ cm}^3$



b) $SA = 2\pi(3.1)^2 + 2(3.1)\pi(11.4)$
$= \cancel{748.7294...}$
$\approx \cancel{749 \text{ cm}^2}$
$= 282.4291...$
$\approx 282 \text{ cm}^2$

2) $\tan\theta = \frac{110}{d}$

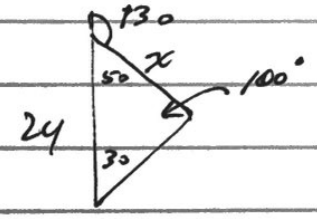


$d_1 = 110 / \tan \cancel{58}\ 7°$
$= \cancel{85.9414...}\ 895.878...$
$d_2 = 110 / \tan \cancel{75}\ 15°$
$= \cancel{485.353...}\ 410.5255...$

$diff = 895.878_m - \cancel{485.353...}\ 410.5255...$
$= 485.353...$
$\approx 485 \text{ m}$

Solutions

3) $\frac{x}{\sin 30^\circ} = \frac{24}{\sin 100}$

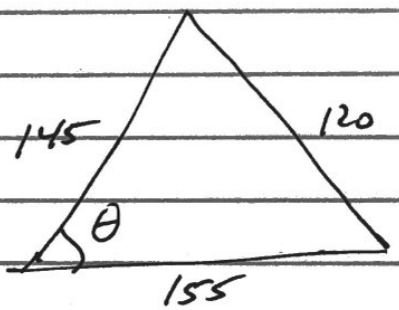


$x = 24 \frac{\sin 30}{\sin 100}$

$= 12.18511\ldots$

≈ 12.2 (3 s.f.)

4) a) $\cos\theta = \frac{145^2 + 155^2 - 120^2}{2(145)(155)}$



$= 0.681868\ldots$

$\theta = \cos^{-1}(0.6818\ldots)$

$= 47.010153\ldots$

≈ 47.0

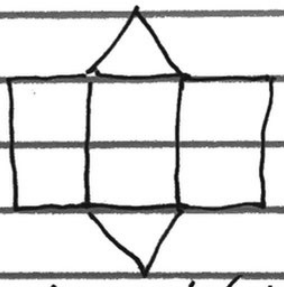
b) $A = \frac{1}{2}(145)(155)\sin 47.01015\ldots$

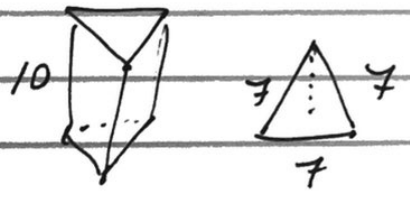
$= 8219.945\ldots$

≈ 8220 m^2

Solutions

5) (a)





b) $V = \frac{1}{2}(7)(7)\sin 60° \times 10$

$= 212.1762...$

$\approx 212 \text{ cm}^3$

c) $A = (3)(7)(10) + (2)(21.217...)$

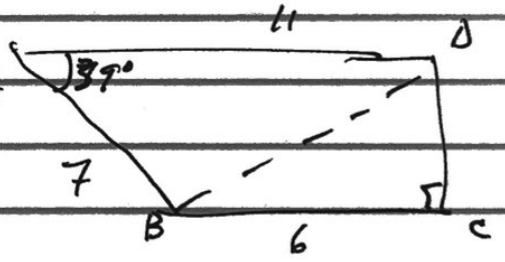
$= 252.435...$

$\approx 252 \text{ cm}^2$

6) a) $BD^2 = 7^2 + 11^2 - 2(7)(11)\cos 39°$

$= 50.319...$

$BD = 7.093625...$



$CD = \sqrt{(7.093...)^2 - 6^2} = 3.78411$

$P = 6 + 7 + 11 + 3.78411... = 27.784...$

≈ 27.8

b) $A = \frac{1}{2}(7)(11)\sin 39° + \frac{1}{2}(6)(3.784...)$

$= 24.2288... + 11.3523...$

$= 35.58117...$

≈ 35.6

Solutions

7) $R_{TOT} = \dfrac{1}{\left(\frac{1}{R_1} + \frac{1}{R_2}\right)}$

R_1: 5.35 (B), 5.45

R_2: 2.65 (A), 1.772... (D), 2.75 (C)

$R_A = \dfrac{1}{\frac{1}{5.35} + \frac{1}{2.65}} = 1.772\,1875... \simeq 1.77$

$R_B = \dfrac{1}{\frac{1}{5.45} + \frac{1}{2.65}} = 1.783\,0248...$

$R_C = \quad = 1.816\,358...$

$R_D = \quad = 1.827\,7439... \simeq 1.83$

a) $1.77 \leq R_{TOT} < 1.83$

b) $\%\ \text{ERROR}_1 = \dfrac{|1.77 - 1.80|}{1.80} = 0.01\overline{6} \simeq 1.67\%$ (1.55%)

(negative) (1.54 %)

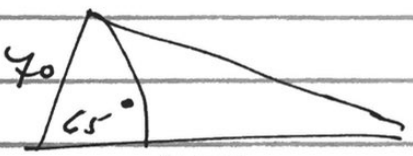
$\%\ E_2 = \dfrac{|1.83 - 1.80|}{1.80} = 1.\overline{6} \simeq 1.67$

$\pm$ 1.67%, $\pm$ 1 2/3 %, $\pm$ 1.54, $\pm$ 1.55

Solutions

8) $A_{\Delta} = \frac{1}{2}(70)(250)\sin 65^\circ$

$= 7930.193\ldots$



$A_{sect} = \pi(70)^2 \times \frac{65}{360}$

$= 2779.436\ldots$

$A_{yard} = 7930.19\ldots - 2779.4\ldots$

$= 5150.756\ldots$

$\approx 5150_{\#}$ m^2

9)