	Calculator Prelim Revision 1 – Answers
1	Find the decimal multiplier $100\% + 8\% = 108\% = 1.08$ Use the formula for 4 weeks $42 \times 1.08^4 = 57.1$ miles Full marks can also be awarded for finding the increase week by week Week 1 $42 \times 1.08 = 45.36$ Week 2 $45.36 \times 1.08 = 48.99$ Week 3 $48.99 \times 1.08 = 52.91$ Week 4 $52.91 \times 1.08 = 57.1$ miles No marks will be given for adding 8% 4 times $42 + 4 \times 3.36 = 655.44$ miles
2	Use Pythagoras $\sqrt{2^2 + (-3)^2 + 8^2}$ Magntiude is $\sqrt{77} = 8.77$
3	Substitute into the formula for the pyramid $150 = \frac{1}{3} \times h \times 6^2$ Find the height $h = \frac{150 \times 3}{36} = 12.5\ cm$
4	$2x^2 + x - 10 = (2x + 5)(x - 2)$
5	Find the volume of the cone $V(c) = \frac{1}{3} \times \pi \times 5^2 \times 7 = 183.2595715..$ Find the volume of the hemisphere $V(h) = \frac{1}{2} \times \frac{4}{3} \times \pi \times 5^3 = 261.799387.$ Add $V(cone) + V(hemisphere)$ $V(toy) = 445.058959 \ldots$ Give rounded answer with units $V(toy) = 450\ cm^3$
6	Evaluate the discriminant $b^2 - 4ac = (-3)^2 - 4 \times 2 \times (-7) = 65$ Substitute into the quadratic formula $x = \frac{-(-3) \pm \sqrt{65}}{2 \times 2}$ Unrounded answers $x = \frac{3 + \sqrt{65}}{4} = 2.76556..,\ x = \frac{3 - \sqrt{65}}{4} = -1.266556 \ldots$ Rounded answers $x = 2.8$ and $x = -1.3$
7	(a) PS is a tangent so angle PTO is $90°$, angle OMT = angle OTM = $90° - 82° = 8°$ Therefore, angle MOT = $180° - 2 \times 8° = 164°$ (b) Use the cosine rule to find a side $MT^2 = 11^2 + 11^2 - 2 \times 11 \times 11 \times \cos 164$ $MT^2 = 474.62533$ $MT = 21.8\ cm$ Can also use the sine rule $\frac{MT}{\sin 164} = \frac{11}{\sin 8},\ MT = \frac{11 \sin 164}{\sin 8} = 21.8\ cm$
8	A fan is made from four identical plastic blades, each blade is a sector of circle. Find the area of one sector $Area = \frac{66}{360} \times \pi \times 7^2 = 28.2\ cm^2$ Find the area of 4 blades $Total\ area\ \ 28.2 \times 4 = 112.8\ cm^2$

9 Simplify $\frac{4x^2}{a} \div \frac{3x^3}{a^4} \rightarrow \frac{4x^2}{a} \times \frac{a^4}{3x^3} = \frac{4a^3}{3x}$

10 Find the length of BC $BC\ is\ 1500 - 600 - 650 = 250\ m$

Use the converse of Pythagoras Longest side squared is $650^2 = 422500$

Sum of short sides squared $600^2 + 250^2 = 422500$

$422500 = 422500,\ 650^2 = 600^2 + 250^2$

By the converse of Pythagoras ABC is a right-angled triangle and this course contains a right-angled turn at marker B

Can also use cosine rule $\cos B = \frac{600^2+250^2-650^2}{2\times600\times250} = \frac{0}{300000},\ B = \cos^{-1}(0) = 90°$

11 Square both sides $t^2 = \frac{g-3}{5}$, multiply by 5 $5t^2 = g - 3$, add 3 $\boldsymbol{g = 5t^2 + 3}$

12 Use the sine rule with angle CBD = $105°$ $\frac{DC}{\sin 105} = \frac{25}{\sin 36}$

Rearrange and evaluate $DC = \frac{25 \sin 105}{\sin 36} = 41.1\ cm$

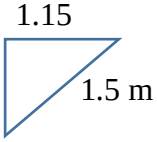
If you use angle ABD = 75°, you will get the correct answer, but you will only get 2 marks

13 Rearrange $\tan x = \frac{17}{7}$

First answer $x = 67.6°$

Second answer $x = 247.6°$

14 Make a right-angled triangle

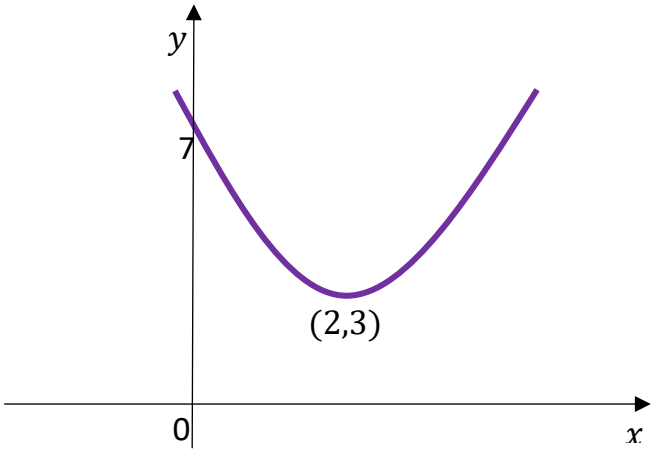


Use Pythagoras $1.5^2 = 1.15^2 + b^2$

$b = \sqrt{1.5^2 - 1.15^2} = 0.96\ m$

Calculate depth of oil $0.96 + radius$

$0.96 + 1.5 = 2.46\ m$

15 (a) $y = (x-2)^2 + 3$

(b) y-intercept at $(0,7)$, turning point at $(2,3)$