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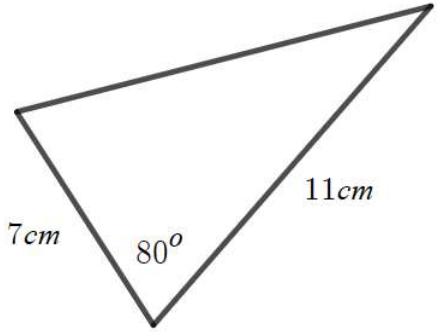
A LEVEL MATHS

(45) The Cosine Rule

WORKING AT D/E

(1) A triangle has side lengths $4cm$, $5cm$ and $6cm$.
(a) Prove that the triangle is not a right-angled triangle.
(b) Use the cosine rule to find the size of the smallest angle in the triangle to 3 S.F.

(2) Show that the perimeter of the triangle below is $30.0cm$ correct to 3 significant figures.

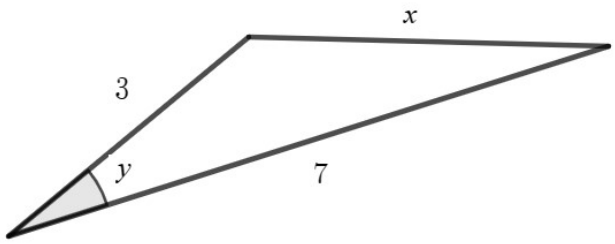


(3) In a right-angled triangle $AB = 2, BC = 3$ and $AC = \sqrt{13}$. One angle in the triangle has size x. Find the smallest possible value for of $\cos(x)$. Give your answer in exact form.

WORKING AT B/C

(1) Beryl walks from home on a bearing of 070^0 for $6km$ before stopping. She then walks on a bearing of 112^0 for $11km$ before stopping.
(a) Find how far from home Beryl now is giving your answer to 3 S.F.
(b) Find the bearing she is now on from home giving your answer to 3 S.F.

(2) The diagram below shows a triangle with side lengths $3, 7$ and x and an angle with size y.

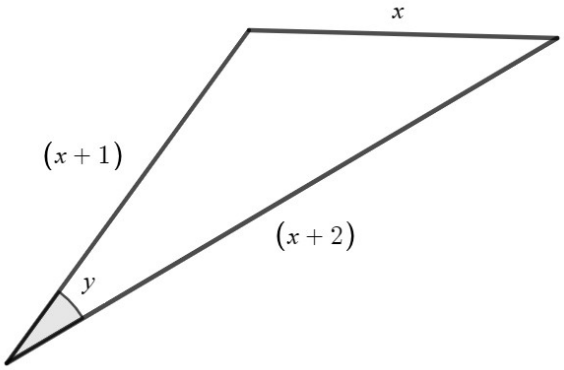


The diagram is not drawn to scale.
(a) Show that $\cos(y) = \frac{58-\ ^2}{42}$
(b) Given further than $y = 30^o$ show, without a calculator, that $x = \sqrt{58 - 21\sqrt{3}}$

(3) A triangle has side lengths in the ratio 2:3:4. Show that the value of the cosine of the largest angle in the triangle will be $\frac{-1}{4}$.

WORKING AT A*/A

(1) The diagram below shows a triangle with side lengths x, $(x+1)$ and $(x+2)$ and an angle with size y.



The diagram is not to scale.

(a) Show that $\cos(y) = \frac{x^2+2x+3}{2x(x+2)}$

(b) In a different triangle $\cos(w) = \frac{x^2+x+1}{2x+3}$. Show that the angle w cannot be a right angle.

(2) Prove, using the cosine rule, that if an isosceles triangle has one side length 1 unit longer than the other two, the angle between the shorter sides will only be obtuse if the longest side is less than $2 + \sqrt{2}$ units.