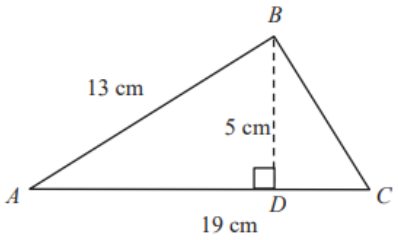
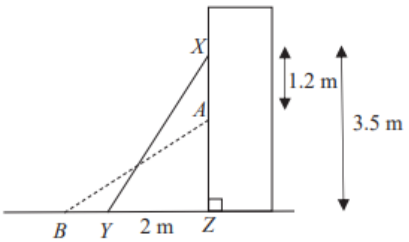
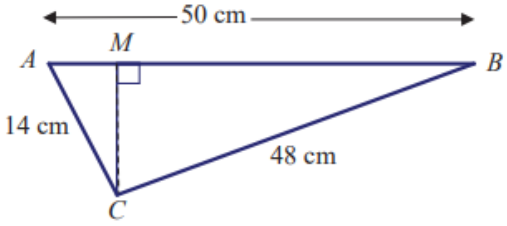
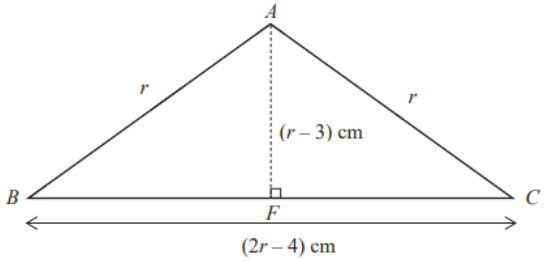
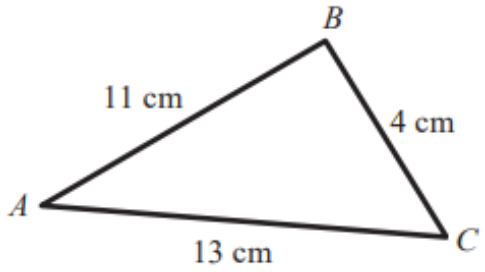
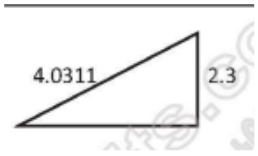
5 MUST KNOW QUESTIONS TO *CONQUER*

PYTHAGORAS THEOREM

1	The diagram shows a triangle ABC with sides $AB = 13$ cm, $AC = 19$ cm, $BD = 5$ cm and angle $ADB = 90°$.  (a) Find the length of AD. (b) Hence or otherwise, find the length of CD. (c) Is angle $ABC = 90°$? Show your reason clearly.	[2] [1] [2]
2	The diagram shows a ladder, XY, that leans against a vertical wall where $XZ = 3.5$ m and $YZ = 2$ m.  (a) Find the length of the ladder. (b) The upper end X slides down 1.2 m to a point A. Calculate the distance the lower end Y has slid away from its original position to a point B.	[2] [3]
3	In the figure below, $AB = 50$ cm, $BC = 48$ cm and $AC = 14$ cm.  (a) Determine if ΔACB is a right-angled triangle. (b) Find the length CM, which is the perpendicular distance from C to AB.	[2] [2]

4	Triangle ABC is an isosceles triangle. $BC = (2r - 4)$ cm and $AB = AC = r$ cm. $AF = (r - 3)$ cm is the perpendicular height of triangle ABC.  (a) Write down an expression, in terms of r, for BF. (b) By using Pythagoras' Theorem, form an equation in r and show that it reduces to $r^2 - 10r + 13 = 0$. (c) Solve the equation $r^2 - 10r + 13 = 0$.	[1] [2] [2]
5	Use Pythagoras' Theorem to decide whether triangle ABC shown in the figure below is a right-angled triangle.  	[2]

Answer Key

1	Solutions: (a) By Pythagoras Theorem, $AD = \sqrt{13^2 - 5^2}$ $= 12$ cm (b) $CD = 19 - 12 = 7$ cm (c) $BC = \sqrt{7^2 - 5^2}$ $= \sqrt{74}\ cm$ $AB^2 + BC^2 = 13^2 + (\sqrt{74})^2$ $= 243$ $AC^2 = 19^2$ $= 361$ Since $AB^2 + BC^2 \neq AC^2$, by the converse of Pythagoras' Theorem, $\measuredangle ABC$ is not 90°. Ans: (a) 12 cm (b) 7 cm	
2	Solutions: (a) Using Pythagoras' Theorem, $XY = \sqrt{3.5^2 + 2^2}$ $= 4.0311288$ $= 4.03m$ (b)  Using Pythagoras' Theorem $BZ^2 = 4.0311^2 - 2.3^2$ $BZ = \sqrt{10.95976}$ $BZ = 3.31055$ $BZ = 3.31$ m $3.31 - 2 = 1.31m$ Ans: (a) $4.03m$ (b) $1.31m$	
3	Solutions: (a) $14^2 + 48^2 = 2500$ $50^2 = 2500$ Since $14^2 + 48^2 = 50^2$ Therefore ΔACB is a right-angled triangle by Pythagoras Theorem (b) $\frac{1}{2} \times CM \times 50 = \frac{1}{2} \times 14 \times 48$ $CM = \frac{336}{25}$ $CM = 13.44cm$ Ans: (b) $13.44cm$	
4	Solutions: (b) $AC = \sqrt{AF^2 + FC^2}$ $r = \sqrt{(r-3)^2 + (r-2)^2}$ $r = \sqrt{(r^2 - 6r + 9) + (r^2 - 4r + 4)}$ $r = \sqrt{2r^2 - 10r + 13}$ $r^2 = 2r^2 - 10r + 13$ $r^2 - 10r + 13 = 0$ (shown) (c) $r^2 - 10r + 13 = 0$ $r = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} =$ $\frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(13)}}{2(1)} = \frac{10 \pm \sqrt{48}}{2}$ $r = 8.4641\ or\ 1.5359$ Ans: (a) $r - 2$ (c) 8.4641 *or* 1.5359	

5	Ans: $AB^2 = 13^2$ $= 169$ $BC^2 + CA^2 = 11^2 + 4^2$ $= 137$ $AB^2 \neq BC^2 + CA^2$ ΔABC is not a right-angled triangle.	