

Marks are indicated in brackets after each question number

2014 Paper 2 Question 6, (4)

Since Lowtown is due west of Midtown then Hightown can only be directly north of Lowtown if the triangle is right-angled. Let H = Hightown, L = Lowtown, M= Midtown

$$\text{Then } (LH)^2 + (LM)^2 = 85^2 + 75^2 = 12,850$$

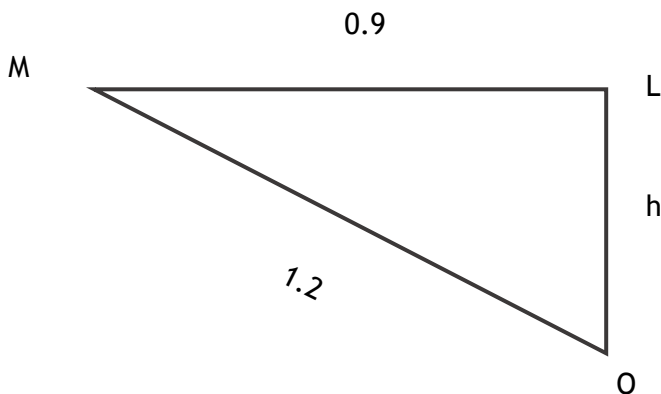
$$(HM)^2 = 110^2 = 12,100$$

Since $(LH)^2 + (LM)^2 \neq (HM)^2$ the triangle is not right-angled

Therefore, Hightown is not directly north of Lowtown

2015 Paper 2 Question 12, (4)

Construct a right triangle from the midpoint of ML with O & M



Using Pythagoras gives

$$1.2^2 = 0.9^2 + h^2$$

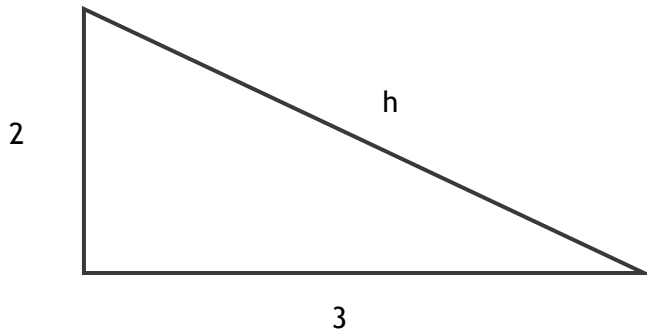
Solving gives $h = 0.79 \text{ m}$

So, depth of milk = $0.79 + \text{radius} = 0.79 + 1.2 = 2.78 \text{ m}$

2016 Paper 1 Question 7, (4)

a) $B = (8, 4, 0)$ by inspection of the graph

b) Create a right-angled triangle in the base



Using Pythagoras, we have

$$h = \sqrt{2^2 + 3^2} = \sqrt{13}$$

$$(AV)^2 = 6^2 + (\sqrt{13})^2$$

$$= 49$$

$$AV = 7$$

2016 Paper 2 Question 16, (4)

Using Pythagoras gives $DE = \sqrt{4^2 - 3^2} = \sqrt{7}$

Using the Sine Rule on ADE gives

$$\frac{\sin A}{a} = \frac{\sin E}{e}$$

$$\frac{\sin A}{\sqrt{7}} = \frac{\sin 90}{4}$$

$$\sin A = \frac{\sqrt{7} \sin 90}{4}$$

$$= 0.661\dots$$

$$A = \sin^{-1}(0.661\dots)$$

$$= 41^\circ$$

Using the Cosine Rule on ABC gives

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$= 6^2 + 10^2 - 2 \times 6 \times 10 \times \cos 41^\circ$$

$$= 45.4$$

$$a = 6.7$$

So, $BC = 6.7 \text{ cm}$

2017 Paper 2 Question 7, (3)

The hypotenuse of the larger triangle is 22 cm

The short sides have length 8 cm and 19 cm

$$8^2 + 19^2 = 425$$

$$22^2 = 484$$

Since $425 \neq 484$ the triangle is not right angled by the converse of Pythagoras

2018 Paper 2 Question 12, (4)

Let M be the mid-point of AB

Construct a right-angled triangle OAM

$$\text{Using Pythagoras, } 13^2 - 10^2 = 169 - 100 = 69$$

$$\sqrt{69} = 8.3$$

$$\text{Width} = \text{Radius} + 8.3 = 13 + 8.3 = 21.3 \text{ cm}$$

2019 Paper 2 Question 11, (4)

The length of B to C is given by $1500 - 600 - 650 = 250 \text{ m}$

$$650^2 = 422,500$$

$$600^2 + 250^2 = 422,500$$

Since $600^2 + 250^2 = 650^2$ a triangle with short sides 600 & 250 and long side 650 is a right-angled triangle by the Converse of Pythagoras' Theorem.

So, ABC is a right-angled triangle, meaning that B is due east of A since C is due north of B.

2019 Paper 2 Question 18, (4)

Create a right angled triangle TSB

Since TS & SB are the radius of the circle they have length 7.5 cm

$$\begin{aligned} \text{By Pythagoras, } TB &= \sqrt{7.5^2 + 7.5^2} \\ &= 10.6 \text{ cm} \end{aligned}$$

TB is the radius of the larger circle, so TD also has length 10.6 cm

So, height = $10.6 + 15 = 25.6 \text{ cm}$