

## Higher Mathematics

### Trigonometric Exact Values - Solutions - 2013-2017

Marks are indicated in brackets after each question number

#### 2013 Paper 1 Question 9, (2)

$$\begin{aligned}\sin 2x &= 2 \sin x \cos x \\ &= 2 \cdot \frac{1}{\sqrt{5}} \cdot \frac{2}{\sqrt{5}} \\ &= \frac{4}{5}\end{aligned}$$

#### 2015 Paper 1 Question 9, (3)

$$\begin{aligned}y + \sqrt{3}x &= 0 \\ y &= -\sqrt{3}x\end{aligned}$$

So, AB has a gradient of  $-\sqrt{3}$  since parallel

$$\tan 150^\circ = -\tan 30^\circ = -\frac{\sqrt{3}}{3}$$

So, BC has a gradient of  $-\frac{\sqrt{3}}{3}$

Thus A,B,C cannot be collinear

2016 Paper 1 Question 13, (5)

$$\cos(q - p) = \cos p \cos q + \sin q \sin p$$

Use Pythagoras to work out the triangle hypotenuse giving

$$\begin{aligned}\cos(q - p) &= \left( \frac{4}{5} \cdot \frac{4}{\sqrt{17}} \right) + \left( \frac{3}{5} \cdot \frac{1}{\sqrt{17}} \right) \\ &= \frac{16}{5\sqrt{17}} + \frac{3}{5\sqrt{17}} \\ &= \frac{19}{5\sqrt{17}}\end{aligned}$$

Multiply by  $\frac{\sqrt{17}}{\sqrt{17}}$  to give

$$\cos(q - p) = \frac{19\sqrt{17}}{85}$$