Year 11 Mathematics Specialist

Test 4 - Trigonometry

MELVILLE
SENIOR HIGH SCHOOL

Student Name : _____

Part One – Resource Free

Part One contains 6 questions worth 38 marks

Time Allowed : 40 minutes

INSTRUCTIONS TO STUDENTS:
You are required to attempt ALL questions,
Write answers in the spaces provided beneath each question.
Marks are shown with the questions.

Show all working clearly, in sufficient detail to allow your answers to be checked readily and for marks to be answered for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.

a)   Sketch the function $y = 2\sin\left(2x + \dfrac{\pi}{4}\right)$ on the set of axes below
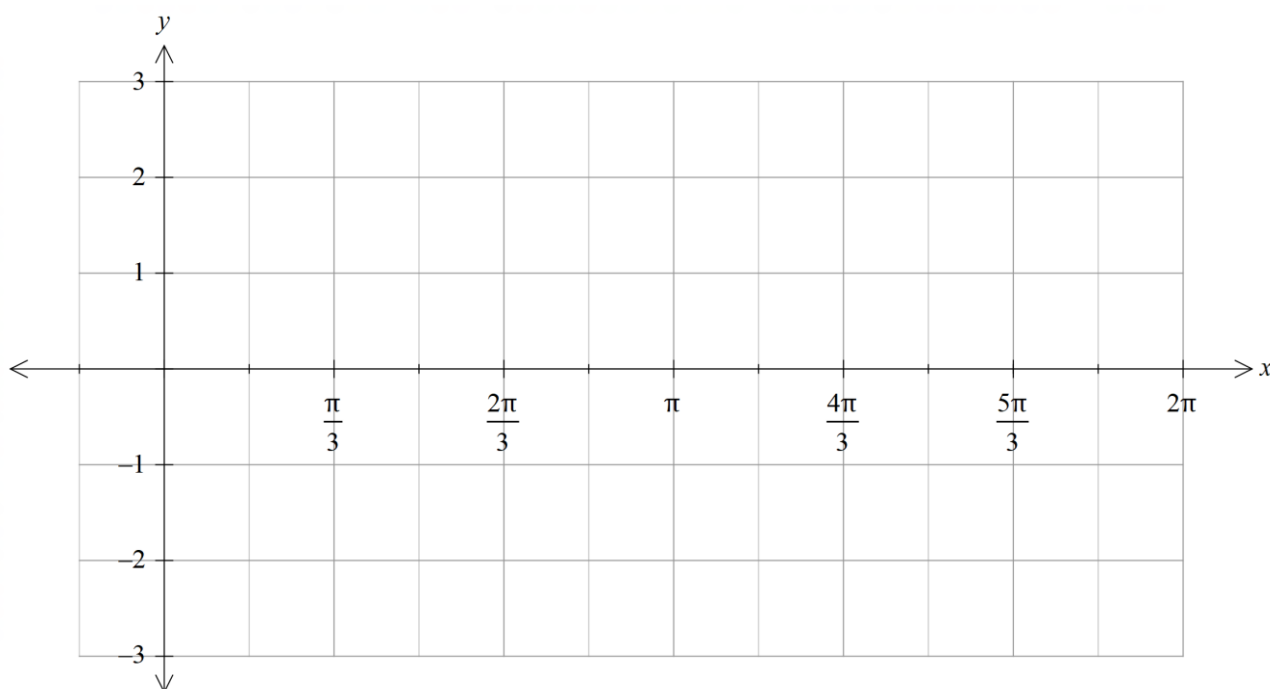
b)   Determine the equation of this graph.
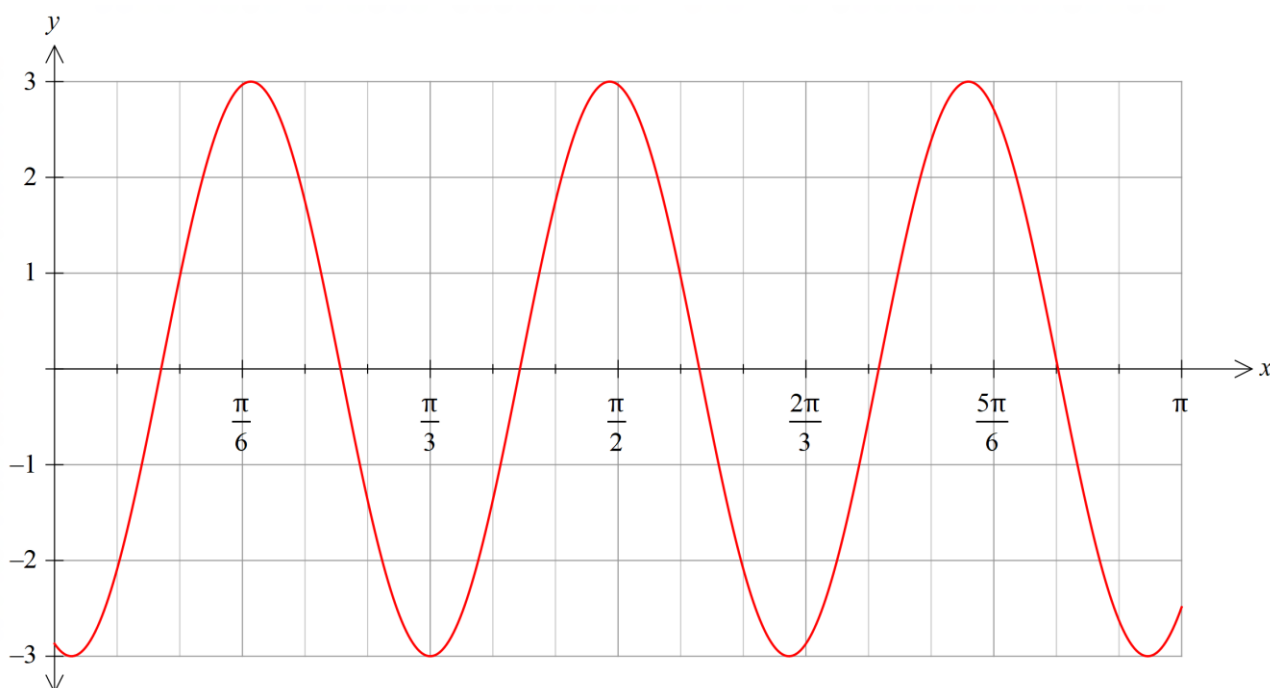
Solve the following equations:

a) $\sin 4x = 0$ for $0 \le x \le 2\pi$.

Identifies correct RA in first 0 to 2pi

Extend to 8pi

Divides by 4 to have 8 answers

b) $\cos 2x - \cos x = 0$ for $0 \le x \le \pi$.

       Replaces cos2x with quadratic in cos
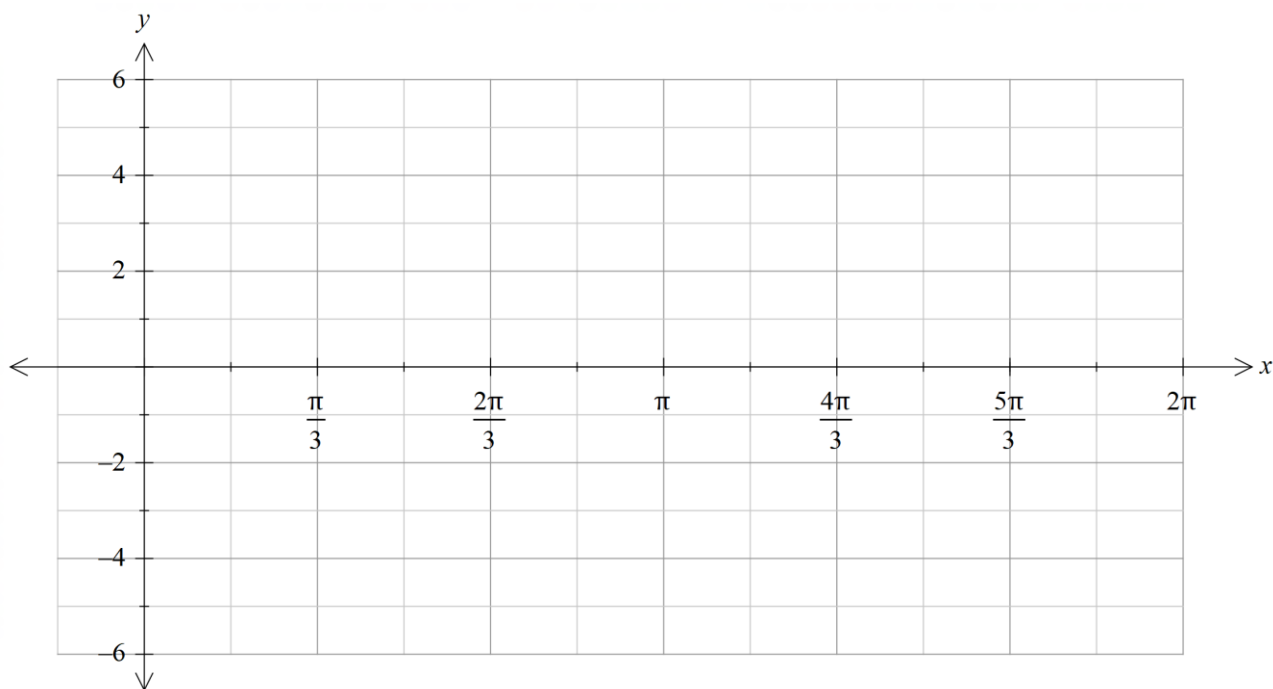
       Correctly fact

       Solves quad equation

a)   Show $\sin x + \cos x = \sqrt{2}\sin\left(x+\dfrac{\pi}{4}\right).$
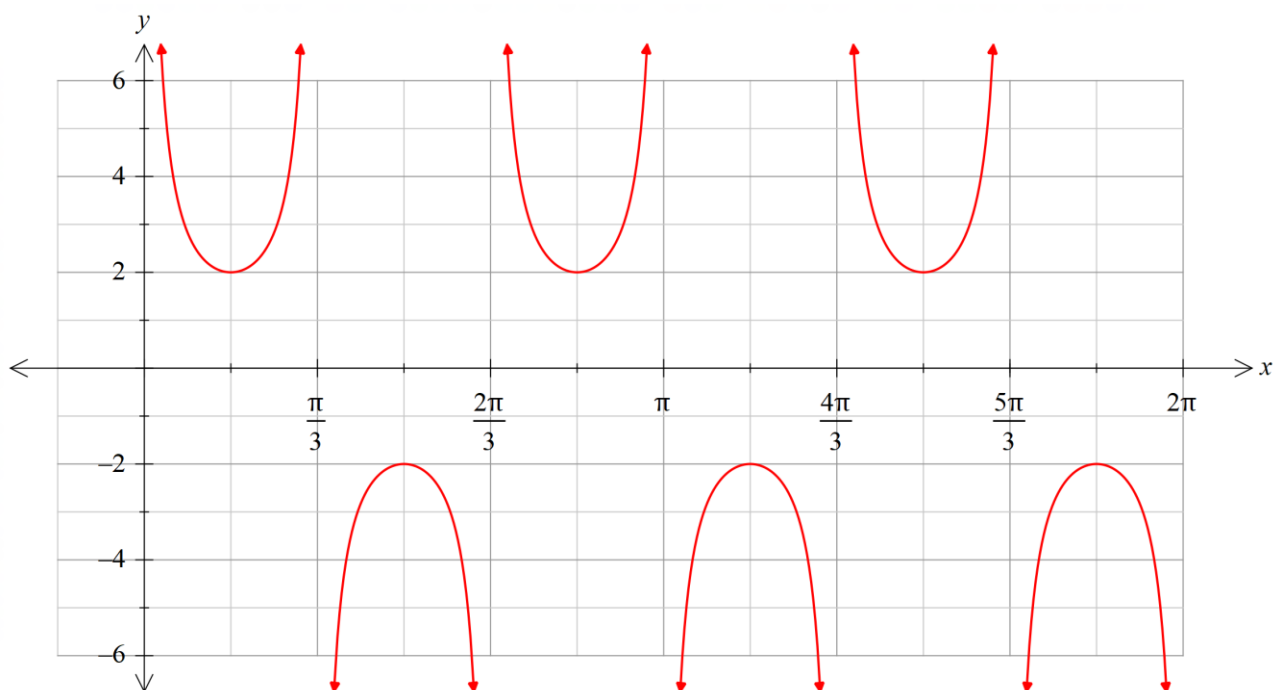
b)   Hence solve $\sin x + \cos x = \sqrt{2}$ for $0 \le x \le \pi.$

a) On the axes provided, sketch the graph of $y = 4\sec x + 1$.

b) Determine the equation of the graph below.

Question 5   **5 marks**

Simplify $\dfrac{\cos\left(\dfrac{\pi}{2}-\theta\right)}{\operatorname{cosec}(\pi+\theta)}$.

Question 6   **3 marks**

a)   Prove that $\sec\theta-\tan\theta\sin\theta=\dfrac{1}{\sec\theta}$.

a)   Find the exact value of tan 75°.

b)   If $\cos x = \dfrac{12}{13}$ and $0 \le x \le \dfrac{\pi}{2}$, find the exact value of $\sin\left(\dfrac{x}{2}\right)$.

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Student Name : _____

Part Two – Resource Allowed

Part Two contains 3 questions worth 21 marks

Time Allowed : 20 minutes

TO BE PROVIDED BY THE STUDENT
A maximum of one A4 page of notes, one sided.
Standard Items : Pens, pencils, eraser, sharpener, correction tape/fluid, highlighters, ruler.

Special Items: Drawing instruments, templates.
A maximum of three CAS calculators satisfying the conditions set by the SCSA.

INSTRUCTIONS TO STUDENTS:
You are required to attempt ALL questions,
Write answers in the spaces provided beneath each question.
Marks are shown with the questions.
Show all working clearly, in sufficient detail to allow your answers to be checked readily and for marks to be answered for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.

Find all the solutions to the equations:

a) $2\cos 3x + \sqrt{3} = 0.$

b) $2\sin^2(2\theta) + 7\sin(2\theta) - 4 = 0.$

a)   Express $y = 3\sin x - \cos x$ in the form $y = R\sin(x - \alpha)$, where $R > 0$ and $0 \leq \alpha \leq \dfrac{\pi}{2}$.

b)   Find the minimum value of this expression and state the smallest positive value of x for which this minimum value occurs.

c)   Solve the equation $3\sin x - \cos x = 2$ for $0 \leq x \leq 2\pi$.

The height, h metres, of a rider above the ground on a large Ferris wheel, at time t minutes after it starts moving can be determined by the equation $h(t) = -68\cos\left(\dfrac{\pi t}{15}\right) + 70.$

a)   At what height do riders get into the seats on the wheel?

b)   How long does the wheel take for one revolution?

c)   What is the maximum height reached by a rider on the wheel?

d)   A rider completes 1 revolution on the wheel.
        For how many minutes is the rider more than 100 metres above ground?

- 4 -