BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

1

Without using your calculator, find the exact value of:

(a) $\sin 30° \cos 60° + \cos 30° \sin 60°$

(b) $\sin 33° \cos 27° + \cos 33° \sin 27°$

(c) $\dfrac{\tan 45° + \tan 15°}{1 - \tan 45° \tan 15°}$

(d) $\dfrac{\tan\frac{7\pi}{12} - \tan\frac{\pi}{3}}{1 + \tan\frac{7\pi}{12}\tan\frac{\pi}{3}}$

(e) $\sqrt{3}\cos 15° - \sin 15°$

TAP FOR ANSWERS

Express the following as a single sine, cosine or tangent:

(a) $\sin 15° \cos 20° + \cos 15° \sin 20°$

(b) $\sin 58° \cos 23° - \cos 58° \sin 23°$

(c) $\frac{\tan 76° - \tan 45°}{1 + \tan 76° \tan 45°}$

(d) $\sin \frac{1}{2}\theta \cos 2\frac{1}{2}\theta + \cos \frac{1}{2}\theta \sin 2\frac{1}{2}\theta$

(e) $\frac{\tan 2\theta + \tan 3\theta}{1 - \tan 2\theta \tan 3\theta}$

TAP FOR ANSWERS

3

(a) Find the value of x for which the curve $y = 800x + \frac{2}{x}, x > 0,$ has a stationary point.

(b) Using the second derivative, determine whether this point is a local maximum or minimum point.

TAP FOR ANSWERS

4

The circle C has centre (5, 2) and passes through the point (7, 3).

(a) Find an equation for C

(b) Show that the line $y = 2x - 3$ is tangent to C and find the coordinates of the point of contact

HINT: Show equal roots

TAP FOR ANSWERS

5

Solve the following equation on the interval $0 \leq \theta \leq 2\pi$. Give answers to 3 decimal places.

$$\frac{4}{sec^2 x} + 3cosx = 2cotxtanx$$

TAP FOR ANSWERS

6

Prove that $\cos\theta + \cos\left(\theta + \frac{2\pi}{3}\right) + \cos\left(\theta + \frac{4\pi}{3} = 0\right)$

You must show each stage of your working.

TAP FOR ANSWERS

7

Given that $\sin x(\cos y + 2\sin y) = \cos x(2\cos y - \sin y)$, find the value of $\tan(x + y)$

TAP FOR ANSWERS

8

Split the following into partial fractions:

a) $\frac{3x^2-2x+1}{2x^4+x}$

b) $\frac{4x^3-12x^2-22x-3}{7x-2x^2+4}$

TAP FOR ANSWERS

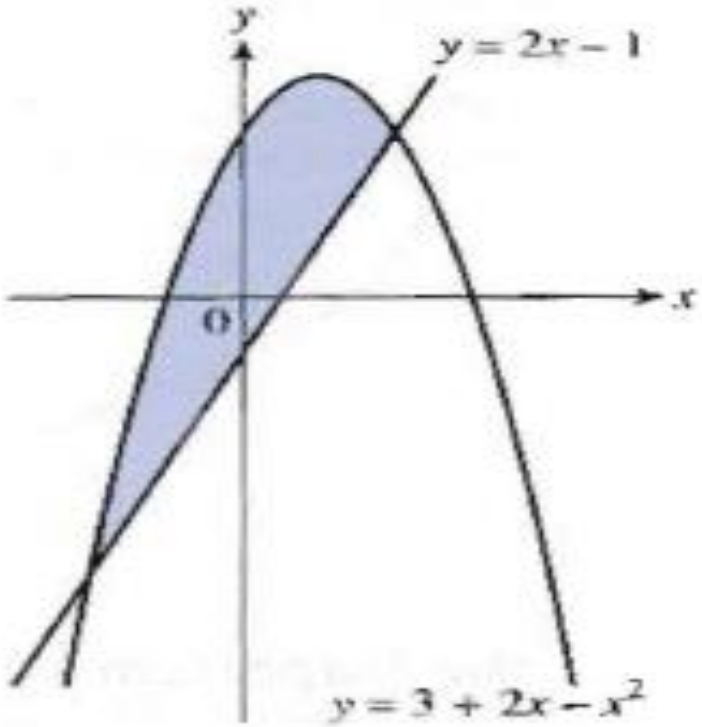
9

Show that $\frac{4x^3-6x^2+8x-5}{2x+1}$ can be written in the form $Ax^2 + Bx + C + \frac{D}{2x+1}$ where A, B, C and D are constants to be found.

TAP FOR ANSWERS

10

Find the area shaded between the line $y = 2x - 1$ and the curve $y = 3 + 2x - x^2$



TAP FOR ANSWERS

11

(a) Sketch the graph of $y = \frac{3}{x}$, remembering to include the equations of any asymptotes. Add to this sketch, the line $y = a - 3x$ which is a tangent to the curve $y = \frac{3}{x}$ at the point A, and the line $y = b - 3x$ which is tangent to the curve $y = \frac{3}{x}$ and the point B.

(b) Find the values of a and b

TAP FOR ANSWERS

12

Use differentiation from first principles to prove that:

if $f(x) = 3x^2$, $f'(x) = 6x$.

TAP FOR ANSWERS

13

The point (6, 1) lies on the circle $x^2 + y^2 - 8x - 4y + 15 = 0$.

(a) Find the equation of the normal to the circle at this point

(b) Find the coordinates of the second point at which the normal cuts the circle

TAP FOR ANSWERS

Disproof by Counter Example

E.g. Show that the statement "$n^2 - n + 1$ is a prime number for all values of n" is untrue.

Ans. n=5 since $5^2 - 5 + 1 = 21$ and 21 is not a prime number.

Therefore, the statement is untrue.

a) Prove by counter-example that the product of an odd and even number is never a perfect square.

TAP FOR ANSWERS

BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

15

Complete this old spec paper,
https://www.madasmaths.com/archive/iygb_practice_papers/c1_practice_papers/c1_m.pdf

Exclude qs 3 and 7

TAP FOR ANSWERS

BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

1 - Answers

(a) 1

(b) $\frac{\sqrt{3}}{2}$

(c) $\sqrt{3}$

(d) 1

(e) $\sqrt{2}$

TAP TO RETURN

2-Answers

(a) $\sin 35°$

(b) $\sin 35°$

(c) $\tan 31°$

(d) $\sin 3\theta$

(e) $\tan 5\theta$

TAP TO RETURN

3 - Answers

(a) $\pm\frac{1}{20}$

(b) $x = \frac{1}{20}$ Minimum (you need to give a reason)

$x = -\frac{1}{20}$ Maximum

TAP TO RETURN

4 - Answers

(a) $(x-5)^2+(y-2)^2=5$

(b) (3, 3)

TAP TO RETURN

BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

5 - Answers

1.131, 5.152

TAP TO RETURN

6 - Answers

Write θ as $\left(\theta + \frac{2\pi}{3}\right) - \frac{2\pi}{3}$ and $\theta + \frac{4\pi}{3}$ as $\left(\theta + \frac{2\pi}{3}\right) + \frac{2\pi}{3}$

Use the addition formulae for cos and simplify.

TAP TO RETURN

BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

7 - Answers

2

TAP TO RETURN

8 - Answers

(a) $\frac{1}{x}+\frac{-2x^2+3x-2}{2x^3+1}$

(b) $-2x-1-\frac{3}{4-x}+\frac{1}{2x+1}$

TAP TO RETURN

9 - Answers

$A = 2,\ B = -4,\ C = 6,\ D = -11$

TAP TO RETURN

10 - Answers

$\frac{32}{3}$

TAP TO RETURN

11 - Answers

(a) Use desmos

(b) 6 and - 6

TAP TO RETURN

12 - Answers

Proof

TAP TO RETURN

13 - Answers

(a) $x + 2y - 8 = 0$

(b) (2, 3)

TAP TO RETURN

14 - Answers

Even number 4
Odd number 9
4x9=36

Since 36 is a perfect square, an even number times an odd number can equal a perfect square, therefore the statement is untrue.

TAP TO RETURN

BHASVIC MαTHS
A1 DOUBLES ASSIGNMENT 11A

15 - Answers

https://www.madasmaths.com/archive/iygb_practice_papers/c1_practice_papers/c1_m_solutions.pdf

TAP TO RETURN