RIGOUR

by cdmasterworks Ltd

Numeracy for Learning, Life and Work

February Higher Maths Calendar

#abitofmathseveryday

1 Find the centre and radius for the circle

$x^2 + y^2 - 14x - 2y - 31 = 0.$

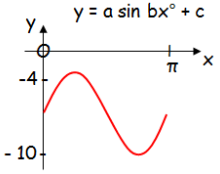
2 The line through (2, -1) and (4, x) has a gradient of 4. What is the value of x?

3 Find the equation of the tangent to the curve $y = x^3 + 3x^2$ where $x = -2$.

4 Find the limit of the recurrence relation

$u_{n+1} = \frac{1}{3}u_n - 6.$

5 What are the values of a, b and c?



6 Show that E(-1, 0, 1), F(2, 6, 7) and G(6, 14, 15) are collinear and find the ratio in which F divides EG.

7 Show that $(x + 5)$ is a factor of $x^3 + 13x^2 + 31x - 45$ and hence factorise it fully.

8 Calculate the inverse function, $f^{-1}(x)$, for;

$f(x) = 6x - 1.$

9 Write $y = 2x^2 - 8x + 7$ in the form $y = a(x + b)^2 + c.$

10 Solve the equation $\sin 2x = \sqrt{3}\sin x$ for $\pi \leq x \leq 2\pi$

11 Express $\cos x° + \sin x°$ in the form $k\sin(x + a)°$ where $k > 0$ and $0 < a < 360.$

12 Differentiate the following;

$\sin^4 x$

13 Simplify the following logarithmic expression;

$4\log_9 3 - 2\log_9 3$

14 If A is an acute angle with $\tan A = \frac{2}{3}$ find the exact value of sin2A.

15 Find the point of intersection between the lines $y = 5 - 3x$ and $y = 1 - x$

16 A curve for which $\frac{dy}{dx} = 3x^2 + 1$ passes through the point (-1, 4). Express y in terms of x.

17 Show that the line y = 3-2y is a tangent to the circle $x^2 + y^2 + 8x - 2y + 12 = 0$ and find the coordinates of the point of contact.

18 Calculate the coordinates of the stationary points on the curve $y = 3x^3 - 9x^2 + 15$ & determine nature.

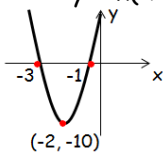
19 A recurrence relation is defined as $u_{n+1} = 3u_n - 2$. If $u_2 = 19$, calculate u_0.

20 State the equation of the graph of the inverse function for $y = \log_7 x$.

21 Differentiate with respect to $f(x) = \frac{x^2 + 2}{\sqrt{x}}.$

22 Calculate the size of the angle that the line $y = 4 - x$ makes with the positive direction of the x-axis.

23 For the equation y = k(x + a)(x + b), what are the values of a, b and k?



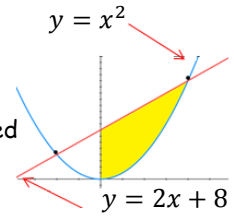
24 State any restrictions on the domain for the function;

$h(x) = \frac{x + 8}{x^2 - x - 12}$

25 Triangle ABC has vertices A(-4, -3), B(-2, 7) and C(6, -1). Calculate the equation of the median from B.

26 The quadratic equation $2x^2 - 3x + k = 0$ has real roots. What are the range values of k?

27 Find the shaded area



28 Calculate the size of the angle between the vectors

$\underline{c} = \begin{pmatrix} 3 \\ 4 \\ -1 \end{pmatrix}$ and $\underline{d} = \begin{pmatrix} 5 \\ 1 \\ 0 \end{pmatrix}$