RIGOUR
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Numeracy for Learning, Life and Work

3rd Level
Number and Number Process
MNU 3-03b

Certificate | Exercises | Homework | Homework Answers
Bronze
Lifeskills | Assessments | Assessment Answers

March Higher Maths Calendar

#abitofmathseveryday

1 A recurrence relation is defined as $u_{n+1} = \frac{1}{4}u_n + 3$. If $u_{10} = 12$, calculate u_{12}.

2 Triangle ABC has vertices A(-1, 6), B(7, 1) and C(11, 3). Calculate the equation of the altitude from A.

3 State any restrictions on the domain for the function;
$$g(x) = \sqrt{2x + 1}$$

4 Find the equation of the tangent at the point (-8, 1) on the circle
$x^2 + y^2 + 4x - 6y - 2 = 0$

5 State the equation of the graph of the inverse function for $y = 4^x$.

6 If A is an acute angle with $\sin x = \frac{1}{\sqrt{3}}$ find the exact value of $\cos 2x$.

7 Calculate the inverse function, $h^{-1}(x)$, for;
$$h(x) = x^3 + 2.$$

8 State why a limit exists and find the limit of the recurrence relation
$u_{n+1} = 0 \cdot 2\, u_n - 3.$

9 Calculate the gradient of a straight line which makes an angle of 120° with the positive direction of the x-axis.

10 Find the centre and radius for the circle
$(x - 7)^2 + (y + 3)^2 = 25$

11 Calculate the coordinates of the stationary points on the curve
$y = x^3 - 12x + 9$
& determine nature.

12 Calculate the length of the line joining $(-3, -1)$ and $(0, -5)$.

13 A curve for which $f'(x) = 1 - 2x$ passes through the point (3, 8). Find $f(x)$.

14 Find the equation of the line which is perpendicular to the line with equation $2y - 2x = 1$ passing through (–4, 10).

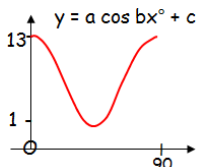**15** Differentiate the following;
$$(2x - 5)^4$$

16 The equation $x^2 + kx + 2k - 1 = 1 - x$ has equal roots. Find the value of k.

17 Write $y = -3x^2 + 12x + 1$ in the form $y = a(x + b)^2 + c.$

18 Find the equation of the tangent to the curve $y = 3x^2 - 7x$ where $x = -1$.

19 Solve the quadratic inequality
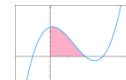$x^2 - 2x - 80 > 0$

20 Solve the following equation
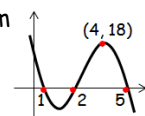$\log_8(2x + 1) = 2 - 4\log_8 2$

21 What are the values of a, b and c?
$y = a \cos bx° + c$
13
1
90

22 Show that R(0, 1, 2), S(5, 11, -13) and T(11, 23, -31) are collinear and find the ratio in which S divides RT.

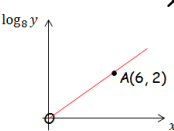**23** Factorise the following polynomial
$f(x) = x^3 - 21x - 20$

24 The vectors $\underline{u} = \begin{pmatrix} k \\ -2 \\ 4 \end{pmatrix}$ and $\underline{v} = \begin{pmatrix} 0 \\ 10 \\ k \end{pmatrix}$ are perpendicular. What is the value of k?

25 The curve $y = x^3 - 4x^2 + x + 6$ intersects the x-axis at points (-1, 0) (2, 0) and (3, 0). Calculate the shaded area.

26 The equation of the cubic shown is of the form
(4, 18)
1 2 5
$y = k(x + a)(x + b)(x + c)$.
What is its equation?

27 Solve the equation $3\cos 2x = \cos x - 1$ for $\pi \le x \le 2\pi$

28 Show that the line $y = x - 4$ does not intersect the parabola with equation $y = x^2 - 2x + 6$.

29 Two variables, x and y, are connected by the law $y = a^x.$
$\log_8 y$
•A(6, 2)
x
Find the value of a.

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

31 For the function $f(x) = \frac{\sqrt{x} + 1}{x},$ find $f'(4).$