A-Level Maths Calculated Colouring Christmas 2023

6	3	25	5	18	4
Green	Yellow	Red	Pink	Blue	Orange

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1) The largest positive solution of $x^2 - 10x + 24 = 0$

2) The $x-$coordinate of the midpoint of AB where $A(2,4)$ and $B(10,2)$

3) The radius of $x^2 - 6x + y^2 - 8y - 11 = 0$.

4) The $y-$intercept of the line between $(-6,4)$ and $(6,8)$.

5) The gradient of $y = \frac{2}{3}x^3 + 2x^2$ at $x = 1$.

6) The $x-$coordinate of the centre of the circle $(x-3)^2 + (y-2)^2 = 4$

7) The coefficient of the x^2 in $(2+4x)^n$ is 96. Find n.

8) $\sqrt{9}$

9) $\frac{x^2+5x+6}{x^2+7x+10}$ can be written in the form $\frac{x+a}{x+b}$. Find a.

10) The x solution of the simultaneous equations $7x + 2y = 29$ and $2x + y = 10$.

11) Find a such that $\sqrt{1875} = a\sqrt{3}$

12) Find the $y-$coordinate of the turning point of the quadratic $y = x^2 + 10x + 50$.

13) The radius of the circle $x^2 - 4x + y^2 - 2y - 20 = 0$.

14) The $y-$coordinate of greatest magnitude from the intersections of the line $y = -x + 4$ and the circle $x^2 - 4x + y^2 - 2y - 20 = 0$

15) The denominator when you rationalise $\frac{4}{\sqrt{5}}$

16) The area of the triangle formed by the line $4x + 9y = 36$, the $x-$axis and the $y-$axis.

17) A triangle has side lengths $4\sqrt{3}$ and 6 with the angle subtended between them being $60°$. Find the area of the triangle.

18) $\sqrt[4]{104976}$

19) The $y-$intercept of the line parallel to $x + 3y = 40$ which passes through the point $(18,12)$

20) The power of 2 in the prime factorisation of 1440.

21) The $y-$solution of the simultaneous equations $7x + 2y = 29$ and $2x + y = 10$.

22) The $x-$intercept of the line perpendicular to the line $y = -\frac{5}{2}x + \frac{61}{2}$ which passes through $(13, -2)$.

23) The product of the roots of the polynomial $p(x) = x^3 - 8x^2 + 21x - 18$.

24) The largest (in magnitude) $x-$coordinate of the points of intersection of the circle $x^2 - 18x + y^2 = 0$ with the $x-$axis.

25) The value of $\binom{4}{1} + \binom{4}{3} + \binom{5}{2}$ where $\binom{a}{b}$ means "a choose b".

26) Find the tangent to the circle $(x-2)^2 + (y-1)^2 = 25$ at $(5,5)$. Give your answer in the form $ax + by = c$. you want the value of a.

27) The denominator when you rationalise $\frac{4}{4+\sqrt{10}}$.

28) Given that $p(2) = 8$ for $p(x) = x^3 + ax - 6$, find the value of a.

29) The discriminant of the quadratic $x^2 + 7x + 6$.

30) A triangle is right angled and has integer side lengths. Given that two sides have lengths 7 and 24 respectively find the other side length.

31) The gradient of the line joining $(1,2)$ to $(4,20)$.

32) The absolute value of the repeated solution of $x^2 + 12x + 36 = 0$.

33) The real valued solution of $2^6 = 4^x$.

34) Find a such that $(x - a)(x + 2)(x - 1) = x^3 - 2x^2 - 5x + 6$.

35) The number of intersection points of the circle $(x - 2)^2 + y^2 = 36$ and the parabola $y = x^2 - 9x + 9$.

36) Given that $(x + 2)$ and $(x + 5)$ are both factors of $x^3 + ax^2 + 31x + b$. Find one tenth of b.

37) The $x-$coordinate of the turning point of the quadratic $y = x^2 - 6x + 3$.

38) Find k such that the point $(7,12)$ lies on the circle $(x - k)^2 + (y - k)^2 = 25$.

39) The intersection point of the line $x + ay = 34$ and $y = x + 6$ is $(4,10)$. Find a.

40) Express the real solution to $5^{2x} + 5^x - 12 = 0$ in the form $x = \dfrac{\ln(a)}{\ln(b)}$. Find a.

41) The area of the triangle formed from the points $A(5,2)$, $B(6,5)$ and $C(9,4)$.

42) Evaluate $\left(\dfrac{1}{5}\right)^{-2}$.

43) $78125^{\frac{2}{7}}$

44) The remainder on dividing $p(x) = x^3 + 5x^2 + 2x + 10$ by $(x + 2)$.

45) The square pf the radius of the circle $x^2 + 6x + y^2 - 4y - 5 = 0$.

46) Find a such that $\sqrt{27} + 2\sqrt{108} - \sqrt{300} = a\sqrt{b}$.

47) The $x-$coordinate of the local minimum of $y = 2x^3 - 9x^2 - 60x + 5$

48) The $x-$coordinate of the intersection point of the line $y = -x + 8$ and the line which passes through $A(-2, -4)$ and $B(7,8)$.

49) Find $x + y$ where x and y are the solutions to the simultaneous equations $4x - y = 5$ and $9x + 2y = 24$.

50) Simplify $\dfrac{3x^2 + 24x + 45}{x^3 + 13x^2 + 55x + 75}$. What is the only number on the denominator?

51) For x and y found in question 49 calculate $3x + 4y$.

52) The number n such that $\displaystyle\sum_{r=1}^{n} r = 171$.

53) One third of the coefficient of the x^2 term in the expansion of $(1 + 3x)^4$.

54) The absolute value of the $y-$intercept of the tangent to $y = x^3 - 4x - 2$ at $(2, -2)$.

55) Find the radius of the circle
$x^2 - 14x + y^2 + 8y - 560 = 0$.

56) The solution y to the simultaneous equations
$2x + y + 3z = 27$, $x + 3y + 2z = 23$ and
$3x - 2y + 4z = 28$.

57) The point $(6,2)$ lies on the line $4x + ay = 34$. Find a.

58) Find the $y-$coordinate of the turning point of the quadratic $y = x^2 - 6x + 27$.

59) The value of z found in question 56.

60) The $x-$coordinate of the turning point of the quadratic
$y = x^2 - 6x + 27$.