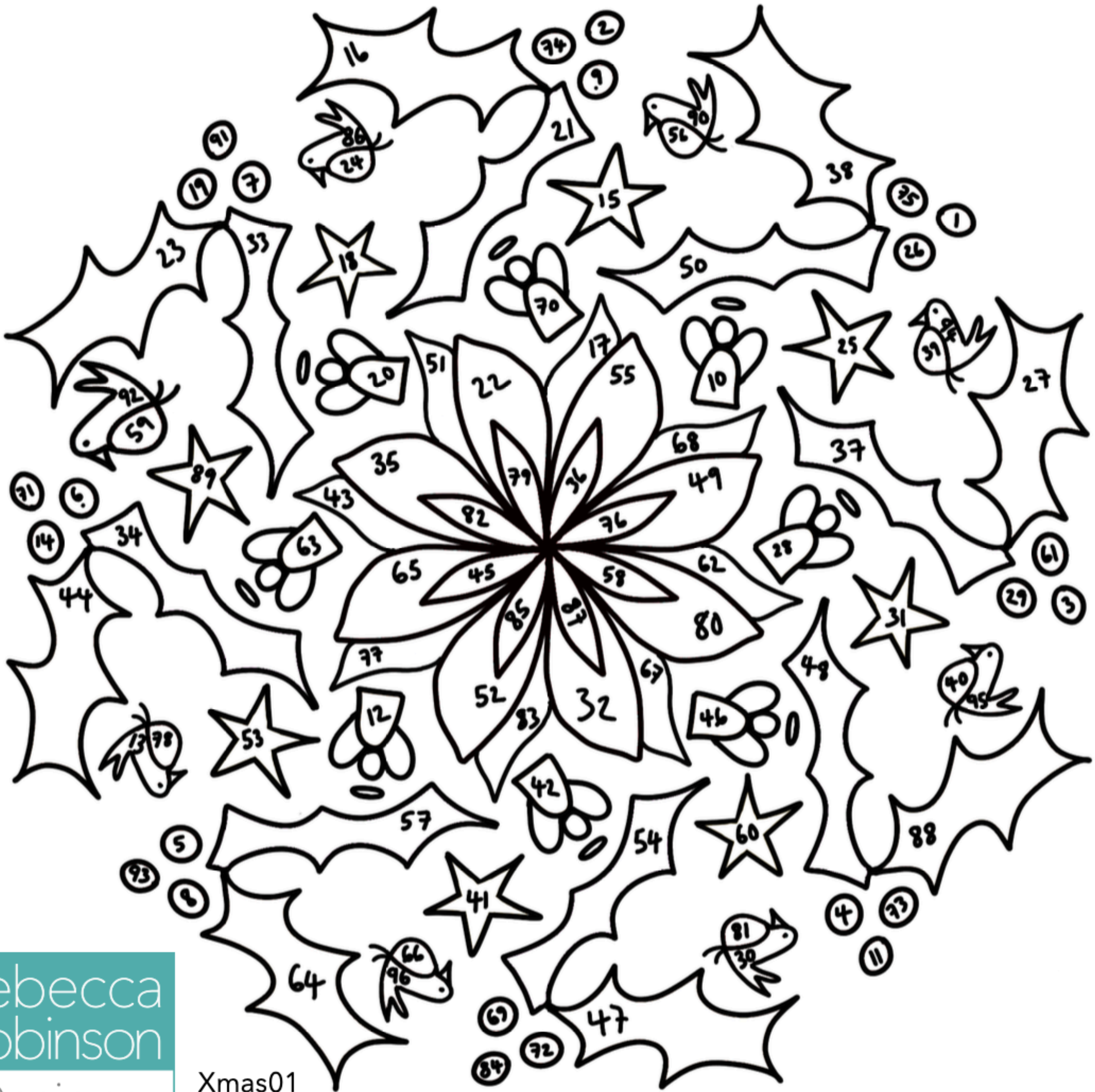
A-Level Christmas Calculated Colouring 2025

Number	5 or 7	25 or 2	9 or 4
Colour	Light Green	Gold	Dark Green
Number	6 or 14	3 or 11	100 or 36
Colour	Pink	Brown	Yellow
Number	15 or -1 or 10 or 8		
Colour	Red		



Xmas01

1 The gradient of the line $x + y = 5$.

2 The number of trailing zeros in $45!$

3 The x coordinate of the turning point for $y = x^2 + 2x + 15$.

4 The denominator when you rationalise $\dfrac{2}{\sqrt{15}}$.

5 The denominator when you rationalise $\dfrac{2}{\sqrt{2} - \sqrt{3}}$.

6 The sides of a triangle all form a Pythagorean Triple. The sides have lengths 9, 12 and x. What is x?

7 The gradient of the line perpendicular to $y = x + 4$.

8 Given that $3^m + 3^n = \dfrac{6562}{243}$ what is $|mn|$?.

9 The vector $\begin{pmatrix} a \\ 20 \end{pmatrix}$ is parallel to $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$. What is a?

10 The sum of the squares of the solutions to $x^2 - 7x + 12 = 0$.

11 The remainder when you divide $p(x) = 3x^3 + 11x^2 + 7x + 2$ by $(x + 3)$.

12 The value of x which solves the simultaneous equations $2x + y + 3z = 17$, $4x - y + z = 7$ and $-2x + 4y + 2z = 18$.

13 The $x-$coordinate of the point of intersection of the lines $5x + 3y = 60$ and $11x - 3y = -12$.

14 The $y-$coordinate of the point of intersection of the lines $5x + 3y = 60$ and $11x - 3y = -12$.

15 Find the discriminant of the quadratic $p(x) = x^2 + 4x - 5$.

16 Given that $(x + 3)$ and $(x - 1)$ are both factors of $x^3 + ax^2 + bx - 6$, find a.

17 The sum of the $x-$coordinates of the points of intersection of the quadratic $y = x^2 - 8x + 12$ and the line $y = x - 2$.

18 Evaluate $f(x) = 3x^2 + 7x - 10$ at $x = 5$.

19 The power of x when you simplify $3x^2y^4 \times 3x^{-3}y^2$.

20 In the expansion of $(1 + ax)^n$ the coefficient of x^2 is 40 and the coefficient of the x^3 term is 80. Find a.

21 Let $f(x) = x^2 + 3$, then $f(x - a) = x^2 - 14x + 52$. What is a?

22 If $x^4 = 50625$, what is x?

23 Find a such that $\sqrt{80} = a\sqrt{5}$.

24 Find that the $x-$coordinate of one of the points of intersection of the circle $(x - 4)^2 + (y - 3)^2 = 25$ and the line $-4x + 8y = 28$, given that the $x-$coordinate of this point is negative.

25 The inverse of the function $f(x) = \dfrac{5x + 25}{10}$ can be written as $f(x) = \dfrac{ax + b}{c}$. Find the square of a.

26 The line of symmetry of the quadratic $y = x^2 - 30x + 259$ is $x = a$. Find a.

27 Find the equation of the tangent to the circle $(x-2)^2+(y-1)^2=25$ at the point $(5{,}5)$ in the form $ax+by=35$. What is the value of b?

28 Solve $2^{2x+4}=256$.

29 The repeated root of $p(x)=x^3-4x^2-11x-6$.

30 The coefficient of n when you find the nth term of the sequence $2,\ 8,\ 16,\ 26,\ 38,\ \ldots$.

31 The smallest number ending in a zero which is also four times a square number.

32 The third term in a sequence with nth term rule $4n+3$ (all numbers in the sequence are positive).

33 Find that the $x-$coordinate of one of the points of intersection of the circle $(x-4)^2+(y-3)^2=25$ and the line $-4x+8y=28$, given that the point is of the form (q,q)

34 The $x-$coordinate of the midpoint of $A(2{,}1)$ and $B(8{,}5)$.

35 The product of the roots of the polynomial $p(x)=x^3-9x^2+23x-15$.

36 The $y-$coordinate of the turning point of the quadratic $y=x^2+2x+15$.

37 The smallest prime factor of 3185.

38 Half of the area of the triangle with side lengths $4\sqrt{3}$ and 6 where the angle subtended between them is 60°.

39 The point $(8{,}9)$ lies on the line $ax+y=1$. Find the value of a.

40 Evaluate 2^3.

41 Given that $\log_{10}(b)=2$, find the value of b.

42 Calculate $\sqrt[11]{2048}$.

43 Line l_2 is perpendicular to $l_1: y=2x$ and passes through the $(8{,}0)$. Find the $y-$intercept of the line l_2.

44 The coefficient of x^2 in the expansion of $(2+kx)^3$ is 96. Find k.

45 The only positive root of the polynomial $p(x)=x^3-4x^2-11x-6$.

46 One less than $\binom{4}{2}+\binom{6}{3}$ where $\binom{a}{b}$ means "a choose b".

47 The third square number.

48 The coefficient of x^3 in the expansion of $(1+2x)^n$ is 280. Find n.

49 The radius of the circle $(x+3)^2+y^2=100$.

50 The length of the line segment $|AB|$ joining $A(8{,}3)$ to $B(12{,}3)$.

51 In the expansion of $\left(2x^2+3y^2\right)^3$ the coefficient of the x^2y^4 term is $6a$. Find a.

52 Solve $4x+7=3$.

53 The square of the radius of the circle $x^2+4x+y^2-8y-80=0$.

54 The $y-$intercept of the line passing through $A(7{,}0)$ to $B(14,-5)$.

55 The point $(2,-12)$ lies on the curve $y=f(x)$. Find a such that the point $(2,a)$ lies on the curve $y=f(x)+27$.

56 The $x-$coordinate of the turning point of $y=x^2+2x+13$.

57 The $x-$intercept of the line joining $A(0{,}5)$ to $B(14,-5)$.

58 The radius of the circle $x^2 + y^2 = 36$.

59 The $x-$intercept of the line $y = -\frac{x}{2} - \frac{1}{2}$.

60 Find $\sum_{r=1}^{6} 2r - 1$.

61 The $y-$coordinate of one of the the points of intersection of the curve $y = x^2 - 1$ and the line $y = x + 11$. This point has a negative $x-$coordinate.

62 The coefficient of x^2 in the expansion of $(3 - x)^3$.

63 The $y-$coordinate of the turning point of the quadratic $y = x^2 + 6x + 34$.

64 Evaluate $\left(\frac{1}{3}\right)^{-2}$.

65 $\binom{5}{3}$.

66 Write $\sqrt{12} + \sqrt{48}$ in the form $a\sqrt{b}$. What is a?

67 The value of y which solves the simultaneous equations $2x + y + 3z = 17$, $4x - y + z = 7$ and $-2x + 4y + 2z = 18$.

68 The point $(6,6)$ lies on the line $3x + by = 12$. Find the value of b.

69 The $y-$coordinate of one of the the points of intersection of the curve $y = x^2 - 1$ and the line $y = x + 11$. This point has a positive $x-$coordinate.

70 Find the tangent at the point $P(4,3)$ to the circle $x^2 + y^2 = 25$ in the form $ax + by = c$. What is the value of c?

71 Points $A(9, -5)$, $B(12,4)$ and $C(-12, -8)$ lie on the circumference of the circle. Find the radius of the circle.

72 $\frac{x^2 + x - 9}{x^2 + 11x + 18}$ can be written in the form $\frac{x + a}{x + b}$. What is the value of a?

73 The most negative root of $P(x) = x^2 + 20x + 75$.

74 Lines $l_1 : y = m_1x + c_1$ and $l_2 : y = m_2x + c_2$ are perpendicular. What is the value of m_1m_2 ?

75 The radius of the circle with equation $x^2 - 12x + y^2 - 18y - 108 = 0$

76 A particle accelerates at 2 ms^{-2} for a distance of 27 metres. Given that its final speed is 12 ms^{-1} what was its initial speed?

77 The number of solutions to the equation $\sin(4x) = \frac{1}{2}$ in the interval $0° \leq x \leq 380°$.

78 The smallest $x-$intercept of the circle $(x - 4)^2 + (y - 3)^2 = 18$

79 Take the magnitude of the most negative solution to $2x^2 + 45x + 238 = 0$.

80 Same answer as Question 78

81 The positive number appearing in the factorisation of $x^2 - 225 = 0$

82 The power of x you obtain when finding the derivative of $y = 3x^7$

83 $\dfrac{x^2+x-9}{x^2+11x+18}$ can be written in the form $\dfrac{x+a}{x+b}$. What is the value of b?

84 If $(x-15)$ is a factor of a polynomial $p(x)$ then what is the a such that $p(a)=0$?

85 Find m such that $(x-m)^2(x+4)=x^3-8x^2-12x+144$.

86 The value of z which solves the simultaneous equations $2x+y+3z=17$, $4x-y+z=7$ and $-2x+4y+2z=18$.

87 The coefficient of n when you find the nth term of the sequence $8,\ 22,\ 36,\ 50,\ 64,\ \ldots$

88 The $y-$coordinate of the circle with equation $x^2-12x+y^2-18y-108=0$

89 $2^2 5^2=$

90 The x solution to the simultaneous equations $5x+2y=13$ and $4x-7y=19$

91 The $y-$coordinate of the local minimum for the function $y=x^3-21x^2+144x-321$.

92 Express the real solution to $5^{2x}+5^x-12=0$ in the form $x=\dfrac{\ln(a)}{\ln(b)}$. What is the value of b?

93 The $x-$coordinate of the local minimum for the function $y=x^3-21x^2+144x-321$.

94 Find the equation of the tangent to the circle $(x-2)^2+(y-1)^2=25$ at the point $(5{,}5)$ in the form $ax+by=35$. What is the value of a?

95 The $y-$coordinate of the midpoint of $A(2{,}1)$ and $B(8{,}5)$.

96 The only prime number raised to an odd power in the prime factorisation of 396.