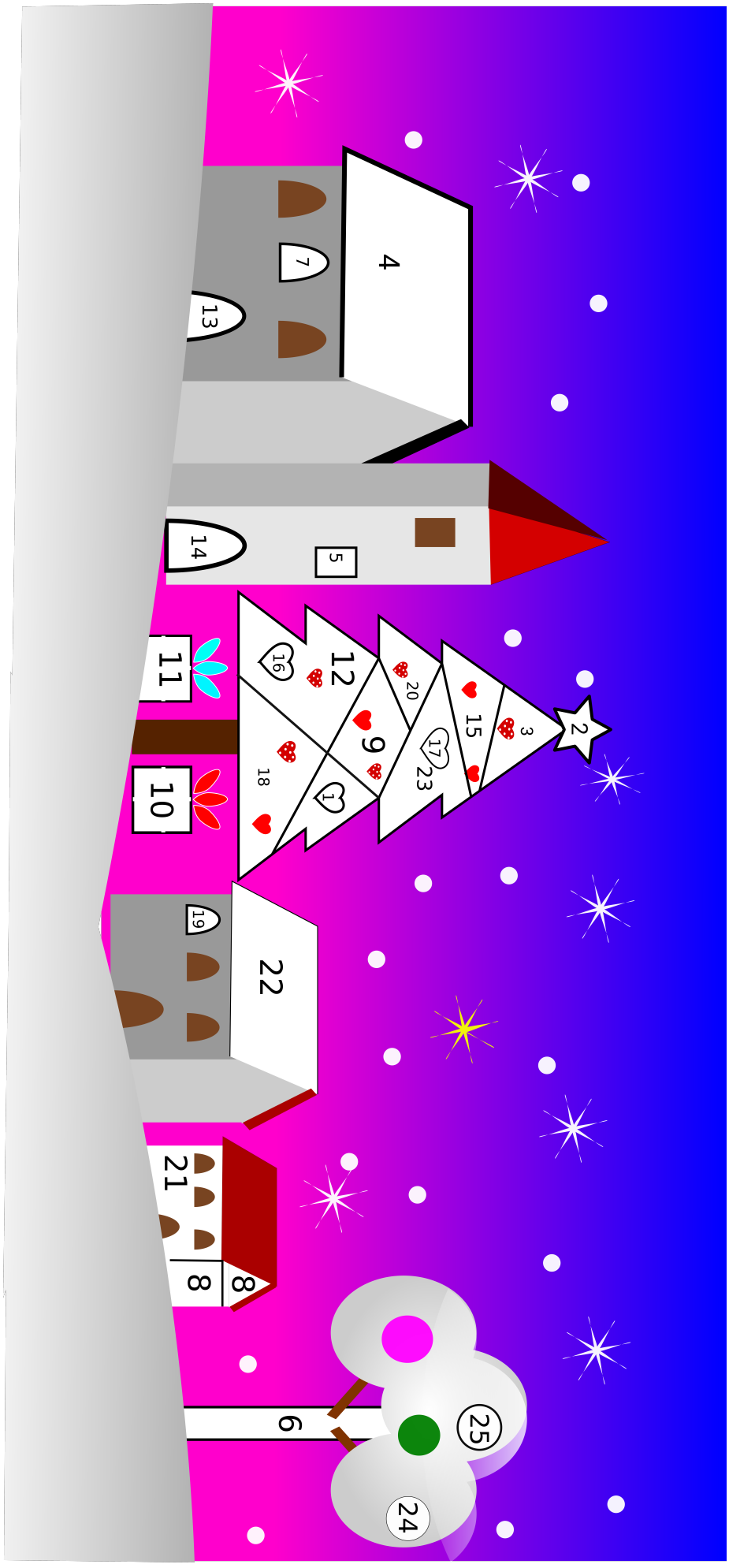
A-Level Further Maths Calculated Colouring 2020



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1. The determinant of the matrix $\begin{pmatrix} 4 & -1 \\ 1 & 6 \end{pmatrix}$.

2. The absolute value of the power of T in the dimensions of force.

3. One more than the imaginary part of $(7+2\mathrm{i})$.

4. zz^* for $z = 3+4\mathrm{i}$.

5. The radius of the complex locus satisfying $|z-(2+3\mathrm{i})| = 10$.

6. The scale factor of the transformation represented by the matrix $\begin{pmatrix} 4 & 0 \\ 0 & 4 \end{pmatrix}$.

7. The positive $x-$ coordinate of where the ellipse $16x^2+100y^2 = 1600$ crosses the $x-$axis.

8. The determinant of a matrix representing a rotation.

9. The absolute value of the gradient of the cartesian equation of the locus of z such that $|z-3| = |z+i|$.

10. The imaginary part of the square root of $-221+60\mathrm{i}$

11. The point with coordinates $(a,2)$ is mapped to the point with coordinates $(46,72)$ by the matrix $T = \begin{pmatrix} 4 & 3 \\ 7 & 1 \end{pmatrix}$. Find a.

12. The matrix $\begin{pmatrix} -\frac{4}{5} & \frac{3}{5} \\ \frac{3}{5} & \frac{4}{5} \end{pmatrix}$ represents a reflection. Find the gradient of the mirror line of this reflection.

13. Find n such that $(1+2\mathrm{i})^n = -7-24\mathrm{i}$

14. Let $B = \begin{pmatrix} 6 & 4 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} 4 & 6 \\ -5 & 3 \end{pmatrix}$. Find the entry $B_{1,1}$.

15. Consider the matrix $A = \begin{pmatrix} 6 & 7 & 1 \\ 5 & 11 & 1 \\ 3 & 7 & 1 \end{pmatrix}$. Find the denominator of the entry $A^{-1}_{1,3}$ where A^{-1} is the inverse matrix of A.

16. The real part of $(7+4\mathrm{i})+3(9+2\mathrm{i})-9(1+4\mathrm{i})$

17. The $x-$ coordinate of the focus of the conic section $y^2+4y = 16x-4$

18. The real part of the two complex solutions to the equation $z^3-5z^2+19z+25 = 0$

19. The determinant of the matrix representing an enlargement is 100. What is the scale factor of this transformation.

20. The reciprocal of the gradient of the line of invariant points for the matrix $M = \begin{pmatrix} 3 & -6 \\ 2 & -5 \end{pmatrix}$

21. For a sound wave travelling in air, the frequency, f, depends on the wavelength, λ, the density, ρ, and the pressure, P. Assuming a relationship of the form $f = k\lambda^\alpha\rho^\beta P^\gamma$, where k is a dimensionless constant find the absolute value of α.

22. The determinant of the matrix A^2

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where $A = \begin{pmatrix} 3 & 7 \\ 1 & 4 \end{pmatrix}$.

23. The denominator of the asymptote (with positive gradient) to the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$.

24. Consider the linear transformation $x' = 6x + 15y$, $y' = 2x + 3y$. Represent this transformation by the matrix T. What is the entry $T_{1,2}$.

25. 12 less than the denominator of $\frac{2 + 7\mathrm{i}}{3 - 2\mathrm{i}}$ when rationalised.

Number	Colour
16	Orange
2	Yellow
10	Blue
4	Dark Brown
1	Light Brown
3	Green
25	Red
15	Pink