A-Level Calculated Colouring 2020

A-Level Calculated Colouring 2020

1. Find the largest positive root of
$$x^2 - 8x + 12 = 0$$

2. The denominator when rationalising $\dfrac{3}{4 + \sqrt{6}}$.

3. The radius squared for the circle
$$x^2 - 6x + y^2 - 4y + 4 = 0.$$

4. The $x-$coordinate of the local maximum of the function
$$f(x) = x^3 - 24x^2 + 45x + 4.$$

5. The gradient of the straight line
$$12x - 2y + 6 = 0.$$

6. The point $(x, x + 1), x \in \mathbb{Z}^+$, lies on the circle
$$x^2 - 10x + y^2 - 10y + 25 = 0.$$
Find the $y-$ coordinate for the largest x.

7. $(x + 5)$ and $(x + 2)$ are both factors of the polynomial
$$f(x) = x^3 + ax^2 + bx + 10.$$
Find b, then subtract 2 from the answer.

8. The coefficient of x^3 in the expansion of $(1 + 2x)^n$ is 160. Find n.

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

10. The repeated root of
$$2x^3 - 31x^2 + 112x + 64 = 0.$$

11. The x solution to the pair of simultaneous equations
$$3x + 2y = 21 \text{ and } 12x - y = 3.$$

12. Find a when $\sqrt{180}$ is written in the form $a\sqrt{5}$.

13. The highest common factor of 270 and 770.

14. The radius of the unit circle.

15. Double the area of the triangle with vertices $A(2,2)$, $B(8,2)$ and $C(-1,8)$.

16. $7776^{\frac{2}{5}}$.

17. The power of z when you simplify
$$\frac{xz^3}{y^4} \times \frac{y^2}{3xz^2}$$

18. $(x + 5)$ and $(x + 2)$ are both factors of the polynomial
$$f(x) = x^3 + ax^2 + bx + 10.$$
Find a.

19. The $x-$intercept of the line passing through $(13, -6)$ parallel to the line $-3x + y = -30$.

20. The solution of $2^x = 4^5$.

21. The $y-$coordinate of the turning point of $y = x^2 - 6x + 15$.

22. The $x-$coordinate of the midpoint of the line segment joining $(-3,1)$ and $(5,10)$.

23. Let A and B be the intersections of the line $3x + 10y = 30$ with the $x-$ and $y-$ axes respectively. Find the area of the triangle OAB where O is the origin.

24. Find the $y-$coordinate of largest magnitude of the intersection points of the circle $x^2 + y^2 = 169$ and the line $4x - 5y = -40$. Subtract 11 from the answer.

25. A triangle ABC has $|AB| = x$, $|AC| = x + 3$, $\angle CAB = 60°$ and

A-Level Calculated Colouring 2020

area $\dfrac{27\sqrt{3}}{2}$ square units. Find x.

26. Half of the $x-$intercept of the tangent to the circle
$(x-5)^2 + (y-5)^2 = 25$ at the point $(8,9)$.

27. The derivative of
$f(x) = 2x^3 + 6x^2 + 5x + 4$
evaluated when $x = \dfrac{1}{\sqrt{3}} - 1$.

28. The y solution to the pair of simultaneous equations
$3x + 2y = 21$ and $12x - y = 3$.

29. The denominator of $\dfrac{1}{\sqrt{8}}$ when rationalised.

30. A square number that is a multiple of the answer to Question 38.

31. The number of solutions to the equation $\cos(x) = \dfrac{\sqrt{3}}{2}$ in the interval $180° \le x \le 360°$

32. One quarter of the discriminant of $y = 2x^2 + 8x + 3$.

33. The $x-$coordinate of the minimum point of the function
$f(x) = x^3 - 24x^2 + 45x + 4$.

34. Find p such that
$\sqrt{18} + \sqrt{50} - \sqrt{98}$ can be written on the form $p\sqrt{2}$.

35. The $y-$ intercept of the straight line $2x + 3y = 18$.

36. The $x-$intercept of the line perpendicular to $2x + 3y = 18$
which passes through $(12,3)$.

37. k such that the point $(5,4)$ lies on the circle
$(x-k)^2 + (y-k)^2 = 25$.

38. The $y-$coordinate of the centre of the circle
$x^2 + 2x + y^2 - 18y + 62 = 0$.

39. Two more than the absolute value of the coefficient of x when expanding $(x^2 + 4x + 3)(x^2 - 5x - 2)$.

40. $2 \times \dbinom{4}{2} + \dbinom{7}{2} + \dbinom{3}{1}$ (these are binomial coefficients).

Answer	Colour
6	Brown
10	Yellow
9	Grey
1	Blue
15	Red
8	Green
25	Light Green
36	Orange