

Answer	3	4	1	12	25 / 2	36	8	10
Colour	Brown	Yellow	Grey	Blue	Red	Green	Light Green	Orange

1) **Grey 1** The absolute value of the product of the gradients of two lines which are perpendicular.

2) **Light green 8** Find a such that $\sqrt{a} = 2\sqrt{2}$.

3) **Grey 1** The power of z when you simplify $\frac{xz^3}{y^3} \times \frac{x^5y^4}{3x^2z^2}$.

4) **Grey 1** The radius of the unit circle.

5) **Yellow 4** The x -coordinate of the centre of the circle $x^2 - 8x + y^2 + 10y + 16 = 0$.

6) **Brown 3** The x -coordinate of the turning point of $y = x^2 - 6x + 21$.

7) **Yellow 4** Find b such that $(x - 2)(x + b)^2 = x^3 + 6x^2 - 32$.

8) **Yellow 4** The remainder on dividing $x^3 + 4x^2 + 3x + 4$ by $(x + 1)$.

9) **Yellow 4** The gradient of the line perpendicular to $y = -\frac{1}{4}x + 3$.

10) **Brown 3** Given that $(x + 5)$ and $(x - 1)$ are factors of the polynomial $x^4 + ax^3 - 15x^2 - 19x + b$, find a .

11) **Brown 3** The gradient of the line passing through $(-2, -1)$ and $(0,5)$.

12) **Orange 10** One quarter of the discriminant of the quadratic $y = 2x^2 + 8x + 3$.

13) **Orange 10** The radius of the circle $x^2 + (y - 3)^2 = 100$.

14) **Orange 10** The denominator when you rationalise

15) **Light Green 8** The coefficient of x^2 in the expansion of $(1 + 3x)^n$ is 252. Find n

16) **Blue 12** The y -coordinate of the turning point of $y = x^2 - 6x + 21$.

17) **Blue 12** The largest root (in absolute value) of the equation $3x^2 - 42x + 72 = 0$.

18) **Green 36** $7776^{\frac{2}{5}}$.

19) **Light Green 8** Find y such that $2x + 4y = 56$ and $x + y = 20$.

20) **Light Green 8** The denominator of $\frac{1}{\sqrt{8}}$ when rationalised.

21) **Blue 12** $20736^{\frac{1}{4}}$.

22) Green 36 $2 \times \binom{6}{2} + \binom{4}{2}$ where $\binom{a}{b}$ represents a choose b .

23) Blue 12 The area of the triangle sandwiched between the x and y -axes and the line which passes through $(-2,9)$ and $(6, -3)$.

24) Blue 12 Find x such that $2x + 4y = 56$ and $x + y = 20$.

25) Blue 12 Find n such that the coefficient of x^3 in the expansion of $(1 + 3x)^n$ is 540.

26) Red 25 / 2 The number of intersection points of the graphs for $x^2 + y^2 = 9$ and the equation $y = 2x + 1$

27) Grey 1 The gradient of the line which is perpendicular to $y = -x + 3$.

28) Red 25 The square of the radius for the circle

$$x^2 + 4x + y^2 - 8y - 5 = 0.$$

29) Red 25 $\sqrt{625}$

30) Grey 1 The x -intercept of the straight line $-x - 4y = -1$.

31) Blue 12 Find the coefficient of x^3 in the expansion of $(2 + 3x)^4$ and then divide it by 18.

32) Yellow 4 The power of x when you simplify $\frac{xz^3}{y^3} \times \frac{x^5y^4}{3x^2z^2}$.

33)

34) Green 36 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 and then multiply by 4.

35) Green 36 The highest common factor of 252 and 180

36) Green 36 Given that $(x + 5)$ and $(x - 1)$ are factors of the polynomial $p(x) = x^4 + ax^3 - 15x^2 - 19x + b$, find b and add 6.

37) Orange 10 The solution of $2^x = 4^5$.

38) Orange 10 The length of the line segment between $(-5, -1)$ and $(3,5)$.

39) Red 25 The radius squared of the circle $x^2 - 8x + y^2 + 10y + 16 = 0$.

40) Grey 1 The power of 11 in the prime factor decomposition of 1980.

41) Green 36 $\sqrt{1296}$

42) Blue 12 The y -intercept of the line parallel to $-2x + y = 12$ which passes through $(-4,4)$.

43) Brown 3 Find a such that $\sqrt{63} = a\sqrt{7}$.

44) Brown 3 Find k such that the point $(7,6)$ lies on the circle $(x - k)^2 + (y - k)^2 = 25$.

- 45) Brown 3** The intersection point of the line $x + ay = 34$ and $y = x + 6$ is $(4, 10)$. Find a .
- 46) Brown 3** The repeated root of the polynomial $P(x) = x^3 - 12x^2 + 45x - 54$.
- 47) Blue 12** The coefficient when you differentiate $y = 4x^3$.
- 48) Blue 12** One twentieth of the coefficient of x when you expand, by the binomial theorem, $(2 + 3x)^5$
- 49) Red 25** The points $A(-4, -3)$ and $B(4, 3)$ is the diameter of a circle. Find the radius squared of this circle.
- 50) Red 25** The y -intercept of the straight line $25x + 6y = 150$