1. Evaluate $3.4 \times 10^3 \times 4.12 \times 10^{-2}$ giving your answer in scientific notation to the correct number of significant figures.
   Answer: $1.4 \times 10^2$

2. Calculate $\frac{-3}{2} \times (10 + 2) ÷ (4 - 10)$ without using a calculator.
   Answer: 3

3. Calculate $\frac{2}{3} + \frac{3}{4}$ without a calculator.
   Answer: $\frac{17}{12}$ or $1 \frac{5}{12}$

4. Solve $3x + y = 9$ for $y$.
   Answer: $y = 9 - 3x$

5. Simplify $x - (5 - 2x)$.
   Answer: $3x - 5$

6. Solve $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$ for $f$.
   Answer: $f = \frac{uv}{u+v}$

7. Solve for $x$ in the equation $\frac{x-6}{2} + \frac{x+8}{6} = 1$ giving your answer to 2 decimal places.
   Answer: $x = 4.00$

8. In the expression $3^{12} \times 3^5 = 3^x$, what is the value of $x$?
   Answer: $x = 17$

9. Simplify the expression $\frac{(x^{1/2}y)^2}{x^2}$.
   Answer: $\frac{y^2}{x}$

10. Find the value of $c$ and $\theta$ in the diagram given.
Answer: $c = 8.4$ to one decimal place, $\theta = 38.2^\circ$ or $\theta = 38^\circ 14'$

11. Find the angle $\phi$ (in degrees) with $0 \leq \phi \leq 90^\circ$ such that $\tan \phi = 1$.
   \[ \text{Answer: } \phi = 45^\circ \]

12. Find all angles $\theta$ (in radians) with $0 \leq \theta < 2\pi$ such that $\cos \theta = \frac{1}{2}$.
   \[ \text{Answer: } \theta = \frac{\pi}{3} \text{ or } \frac{5\pi}{3} \]

13. A surveyor standing at a distance of 40m from the base of a tower has measured the angle (in degrees) to the top of the tower as $60^\circ$. Write an expression for the height of the tower in terms of that angle (in degrees) and find the height of the tower.
   \[ \text{Answer: } \text{The expression for the height is } h = 40 \times \tan(60^\circ). \text{ The height is 69 metres correct to the nearest whole number.} \]

14. What is the amplitude and period of the function $y = 2\sin\left(\frac{x}{2}\right)$?
   \[ \text{Answer: } \text{The amplitude is 2, the period is } 4\pi. \]

15. (a) Solve $\cos\left(x - \frac{\pi}{4}\right) = 0$ for $x$ (in radians) with $0 \leq x < \pi$.
   (b) What is the value of $x$ in degrees?
   \[ \text{Answer: } \text{(a) } x = \frac{3\pi}{4}, \text{ (b) } x = 135^\circ \]

16. Given that $10^x = 136.14$ find the value of $x$.
   \[ \text{Answer: } x = 2.134 \text{ to 3 decimal places} \]

17. True or false? $\log\left(\frac{a}{b}\right) = \frac{\log a}{\log b}$ for all positive numbers $a$ and $b$.
   \[ \text{Answer: } \text{False} \]

18. Simplify $\log_3 9 + \log_4 2$.
   \[ \text{Answer: } 2.5 \]

19. If $\log_2 (x) = 5$, what is $x$?
   \[ \text{Answer: } x = 32 \]

20. Find all real numbers $x$ such that $e^{-x} = \frac{1}{2}$.
   \[ \text{Answer: } x = \ln 2 \text{ or you could write } x = \log_e 2 \]