1. (a) Simplify \((1) \left(64\right)^{\frac{2}{3}} \); \((2) 11^0\); \((3) \frac{1}{2^-3}\).  
(b) Four similar smaller castings are the same weight as three similar larger castings. Calculate the weight of a smaller casting if all 7 weigh 12 lbs.
(c) Simplify \((2a - b)^2 - a(3a + b) + 3ab\).
(d) Write the correct number in place of "n" in each of the following:
   (1) \(225,000,000 = 2.25 \times 10^n\).
   (ii) \(0.0001 = 1.0 \times 10^n\).
(e) The sum of two numbers is to be subtracted from their product. Using \(x\) and \(y\) for the numbers and \(A\) for the result, construct a formula for this operation. Find \(A\) when \(x = 5\) and \(y = 6\).

2. (a) Simplify \(\frac{\frac{4}{5} - \frac{3}{8} \times \frac{12}{7}}{12 + 8\frac{1}{2} + 2\frac{1}{2}} \times \frac{5}{6}\).
(b) Simplify \(\frac{12(a^3 - x^3)}{a^2 + x^2} \times \frac{a + x}{a - x} + \frac{8(a^2 + ax + x^2)}{a^2 + x^2}\).

3. (a) Prove that the sum of the 3 angles of any triangle is equal to \(180^\circ\).

(b) In the above figure the angle \(DAB\) is a right angle and the angle \(ABC\) is twice as large as the angle \(ADB\). Calculate the number of degrees in the angle \(ABC\).

OVER
4. (a) Evaluate, using logarithms:
\[
\sqrt[31.2]{2.568 \times 0.2213}
\]

(b) If \( a = b^x \sqrt{\frac{c^2}{d}} \) then \( \log a = \ldots \ldots \ldots \ldots \)

(c) If \( \log 3 = m \) and \( \log 5 = n \) write down the logarithms of 15, 6 and 75 in terms of \( m \) and \( n \).

(12 marks)

5. There are 350 children enrolled in a school. Draw a graph which will enable you to express the number of children present as a percentage of the total enrolment.

Find from your graph:

(i) the percentage attendance when 275 children are present,
(ii) the number of children present on a day of 92% attendance,
and (iii) which corresponds to the better attendance, 325 children, or 96%.

(12 marks)

6. (a) If the volume of a right circular cylinder is \( 704 \text{ cm}^3 \) and the perpendicular height is \( 14 \text{ cm} \), what is the diameter of the base \( r \) ? (Take \( \pi = \frac{22}{7} \)).

(b) Calculate the total surface area of the above cylinder.

(12 marks)

7. Solve the equations:

\[
\begin{align*}
(1) \quad (3x - 19)(x + 2) &= (3x + 1)(3x - 2) \\
(ii) \quad 2x + 2y + 6 &= 0 \\
&\quad 3x - y + 3 &= 0 \\
(iii) \quad 3x^2 - 10x - 8 &= 0.
\end{align*}
\]

(14 marks)

8. (a) In the \( \triangle ABC \) the angles \( ABC \) and \( BAC \) are \( 90^\circ \) and \( \alpha^\circ \) respectively. Show that:

(i) \( \sin^2 \alpha + \cos^2 \alpha = 1 \),

(ii) \( \frac{\sin \alpha}{\cos \alpha} = \tan \alpha \).

(b) If in the triangle \( ABC \), the angle \( B = 90^\circ \) and \( \sin C = \frac{4}{5} \), find without using tables \( \cos C \), \( \tan C \) and the area of the triangle \( ABC \).

(14 marks)

9. Factorize the following:

(a) \( 4x^2 - 6xy \).

(b) \( 3ax + 3bx - 4ay - 4by \).

(c) \( 6a^2 - 7ac - 3a^2 \).

(d) \( 8x^3 + 27y^3 \).

(e) \( a^2 - 2ab + b^2 - c^2 \).

(14 marks)

10. On \( \frac{1}{16} \) inch graph paper, plot the four points \( A, B, C, D \) whose co-ordinates are \( A(2,3), B(8,12), C(0,9) \) and \( D(12,0) \). Join \( AB \) and \( CD \).

Write down the co-ordinates of the point of intersection of \( AB \) and \( CD \). Find the equations of the lines \( AB \) and \( CD \) in the form \( y = mx + c \).

(14 marks)