

PRELIMINARY MATHEMATICS EXTENSION REVISION WORKSHEET #1

COURSE/LEVEL

NSW Secondary High School Year 11 Preliminary Mathematics Extension.

1. Solve these inequations and graph their solutions on a numberline:

(a) $2x^2 - x - 1 < 0$

(b) $\frac{4}{x-3} \leq 1$

(c) $\frac{x+5}{x-5} > 0$

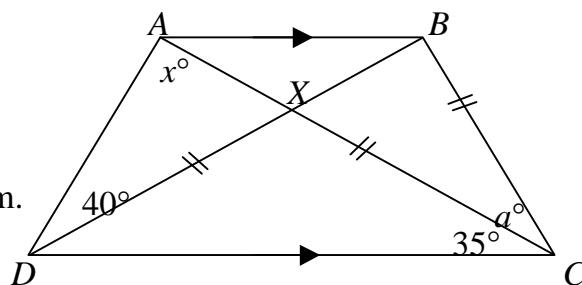
(d) $\frac{x^2 - 4}{x-1} > 0$

2. In the diagram, $DX = CX = CB$ and $AB \parallel DC$.

Several angles are labelled.

Give reasons for your answer to the following.

- (i) Explain why $\triangle AXB$ is isosceles.
- (ii) Name two congruent triangles in the diagram.
- (iii) Find a .
- (iv) Find x .



3. The elevation to the top of a high rise building at a place X due west of it is 78° and at a place Y due south of X the elevation is 58° . If the distance from X to Y is 200 metres. Find the height of the building.

4. Show that $\frac{\sin A}{\cos A + \sin A} + \frac{\sin A}{\cos A - \sin A} = \tan 2A$. (HSC '93, Q.2a)

5. The angle between the lines $y = mx$ and $y = x$ is 30° . Find the exact value of m .

6. Find the coordinates of the point that divides externally the interval joining the points $A(7, 2)$ and $B(6, 3)$ in the ratio 4:5.

7. Prove, by mathematical induction, that

$$\frac{1}{1 \times 4} + \frac{1}{4 \times 7} + \frac{1}{7 \times 10} + \cdots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$$

where n is any positive integer.

8. Solve the equation $|x+1|^2 - 4|x+1| - 5 = 0$.

9. The point $P(x, y)$ moves on a path such that its distance from a point $S(3, 5)$ is the same as its perpendicular distance from the line $y = -3$. Show that the equation of the path of P is $(x-3)^2 = 16(y-1)$.

10. Sketch the graph of $y = \frac{x-2}{x^2-9}$, showing all important features, including any x - or y -intercepts and horizontal or vertical asymptotes.

11. (i) Sketch the graph of $y = \frac{5}{x(2x-3)}$ showing any x or y intercepts and asymptotes.

(ii) Solve the equation $\frac{5}{x(2x-3)} = 1$.

(iii) Use your sketch to solve the inequality $\frac{5}{x(2x-3)} \geq 1$.

12. If $(x+1)$ is a factor of the polynomial $P(x) = 2x^4 - 2x^2 - a$, find the value of a .

13. If $2x^2 - x + 3 \equiv A(x+2)(x-2) + B(x+1) + C$, find the values of A , B and C .

14. If α, β, γ are the roots of $x^3 - 5x^2 - 3x + 2 = 0$, find the values of

(i) $\alpha^2 + \beta^2 + \gamma^2$, (ii) $\alpha^2\beta\gamma + \alpha\beta^2\gamma + \alpha\beta\gamma^2$.

15. The three consonants H, S, C and the five vowels A, E, I, O, U are arranged around a circle.

(i) In how many ways may these letters be arranged?

(ii) How many arrangements are possible if the three consonants must be together?