

Sekeloahe HL 2023

$$A1) \frac{y(y^2 - 9y + 8)}{y-1} + \frac{(3y-2)(y+4)}{3y-2} = -2$$

$$\frac{y(y-1)(y-8)}{y-1} + y+4 = -2$$

$$y^2 - 8y + y + 6 = 0$$

$$y^2 - 7y + 6 = 0$$

$$(y-6)(y-1) = 0$$

$$y=1 \text{ or } 6$$

A2)

$$S = -3 - 5 - 7 - \dots - 43 + 7 + 12 + 17 + \dots + 107$$

$$= \frac{21}{2}(-3 - 43) + \frac{21}{2}(7 + 107)$$

$$= \frac{21}{2} \times -46 + \frac{21}{2} \times 114$$

$$= 21 \times (-23) + 21 \times 57$$

$$= 21 \times (57 - 23)$$

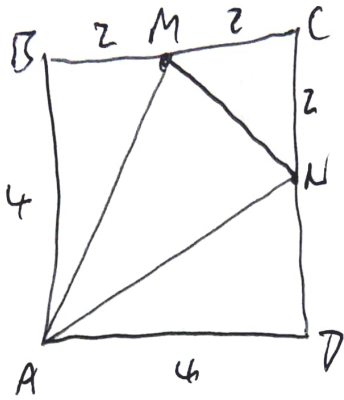
$$= 21 \times 34$$

$$= 714$$

$$\begin{array}{r} 34 \\ 21 \\ \hline 714 \\ 68 \\ \hline 714 \end{array}$$

$$\left( \begin{array}{l} \frac{n}{2} a + l \\ \frac{n}{2} (\text{first} + \text{last}) \end{array} \right)$$

A3)



$\sin \theta$  is a ratio so can arbitrarily set  $MC=2$

Area  $ABM = 4$ ,  $ADN = 4$ ,  $MNC = 2$   
 $ABCD = 16$

So  $AMN = 16 - 4 - 4 - 2 = 6$

$$6 = \frac{1}{2} \times AN \times AM \times \sin \theta$$

$$6 = \frac{1}{2} \times 20 \times \sin \theta$$

$$\sin \theta = \frac{3}{5}$$

$$AN = \sqrt{4^2 + 2^2} = \sqrt{20} = 2\sqrt{5}$$

B1)

$$f(xy) = \frac{f(x)}{y}$$

$$f(500) = 3$$

$$f(100 \times 5) = 3$$

$$\frac{f(100)}{5} = 3$$

$$f(100) = 15$$

$$f(600) = \frac{f(100)}{6}$$

$$= \frac{15}{6}$$

$$= \frac{5}{2}$$

$$82) S_1 = t_1 + t_2 + t_3 + \dots + t_{47}$$

$$S_2 = t_1 + \overbrace{t_3 + \dots + t_{45}}^p + t_{47}$$

$$= 12p$$

$$1272 = 12p$$

$$p = \frac{1272}{12} = 106$$

$$S_1 = \frac{n}{2}(a+u)$$

$$\frac{n}{2}(first + last)$$

$$= \frac{47}{2} \times 106$$

$$= 47 \times 53$$

$$= 2491$$

$$\begin{array}{r} 53 \\ 47 \\ \hline 371 \\ 2120 \\ \hline 2491 \end{array}$$

$$83) \frac{3x^2 + 9x + 7}{3x^2 + 9x + 7} = \frac{3x^2 + 9x + 7}{3x^2 + 9x + 7} + \frac{10}{3x^2 + 9x + 7}$$

$$= 1 + \frac{10}{3(x^2 + 3x + \frac{7}{3})}$$

$$= 1 + \frac{10}{3[(x + \frac{3}{2})^2 - \frac{9}{4} + \frac{7}{3}]}$$

$$= 1 + \frac{10}{3[(x + \frac{3}{2})^2 + \frac{1}{12}]}$$

$$= 1 + \frac{10}{3(x + \frac{3}{2})^2 + \frac{1}{4}}$$

$$\leq 1 + \frac{10}{\frac{1}{4}} = 41$$