

sheet 4

1

$$(a) \quad 6rs = 2(\underbrace{3rs}_k) = 2k \quad \text{even.}$$

yes.

$$(b) \quad 6r + 8s^2 + 7 = 2(\underbrace{3r + 4s^2 + 3}_k) + 1$$
$$= 2k + 1 \quad \text{odd.}$$

yes.

$$(c) \quad r^2 + 2rs + s^2 = (r+s)(r+s)$$

Report

2 (a) $n > 5$

$2n-1 \rightarrow$ is prime.

assume $n=6$ $\therefore 2n-1 = 12-1 = 11 \rightarrow$ Prime.

(b) $m > 1$

$n > 1$

$\frac{1}{m} + \frac{1}{n} \rightarrow$ integer

assume $n=2$ and $n=2$ $\therefore \frac{1}{2} + \frac{1}{2} = 1$

1

(c) Report

(d) $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$

assume that $a=0$ and $b=9$.

$$\sqrt{0+9} = \sqrt{0} + \sqrt{9} = 3$$

3

(a) $2m+n \rightarrow \text{odd}$ if m, n is also odd.

false if $2m+n = 5$ odd.

even $\leftarrow m=2 \quad n=1 \rightarrow \text{odd}$.

(b) The product of any two odd \rightarrow is odd.

True \because $m = 2k+1$ $n = 2k+1$ $m \cdot n = (2k+1)(2k+1)$
 $= 4k^2 + 4k + 1 = 2(\underbrace{2k^2 + 2k}_k) + 1$
 $2k+1 \rightarrow \text{odd}$

(c) The sum of any even and any odd is \rightarrow odd.

$m = 2k+1$ odd $2k+1 + 2k = 4k+1$
 $n = 2k$ even $2(2k) + 1$
true $\underbrace{\hspace{1cm}}_{\text{odd}}$

2

(d) The difference of any even integer minus any odd \rightarrow is odd.

$$\begin{aligned} m &= 2k \text{ even.} & m-n &= 2k - (2k+1) \\ n &= 2k+1 \text{ odd.} & &= 2k - 2k - 1 = -1 \end{aligned}$$

True.

(e) The product of any even integer and any integer is even.

$$\begin{aligned} m &= 2k & \text{Case 1: } m \cdot n &= 2k \cdot 2k = 4k^2 = 2(\underbrace{2k^2}_k) \\ n &= 2k & & \text{even.} \end{aligned}$$

$$\begin{aligned} m &= 2k & \text{Case 2: } m \cdot n &= 2k \cdot (2k+1) = 4k^2 + 2k \\ n &= 2k+1 & &= 2(\underbrace{2k^2 + k}_k) \\ & & & \text{even.} \end{aligned}$$

True.

(f) The difference of any two even integers is even.

$$\begin{aligned} m &= 2k & m-n &= 2k - 2s = 2(\underbrace{k-s}_k) = 2k \\ n &= 2s & & \text{Even.} \end{aligned}$$

True.

4

If Today is Tuesday, what day of the week
Will it be 1,000 days from today?

6 → days

→ Monday.

Saturday

Sunday

Monday ✓✓

Tuesday

Wednesday

Thursday

Friday

5

Report

4