

EXERCISE BOOK

Name: Abdul Musthakin Class: _____
Topic: _____ Teacher: _____



UKMT SMC 2015

1) D ✓

$$2015^2 - 2016 \times 2014$$

$$= 2015^2 - (2015+1)(2015-1)$$

$$= 2015^2 - (2015^2 - 1^2)$$

$$= 1$$

3) A ✗ B

$$6x = \frac{150}{3c}$$

$$\frac{150}{6} = \frac{25}{2}$$

4) B ✓

$$\frac{\pi r^2}{4}$$

$$6x^2 = 150$$

5) A ✓

$$\rightarrow \frac{2}{7}$$

$$x^2 = 25$$

$$\frac{4}{5} \times \frac{2}{7} = \frac{12}{35} = \frac{6}{5}$$

6) E ✓

HTT

$$n = \frac{17+23+2n}{3}$$

$$5-5=0$$

7) B ✓

X X X

$$3n = 17+23+2n$$

$$50x = 40$$

$$n = 17+23 = 40$$

$$x = \frac{40}{50} = \frac{4}{5}$$

$$\leq = 4+0 = 4$$

$$x = 0.8$$

8) D

X X |||

$$\begin{aligned} 5+9 &= 14 \\ 5+7 &= 12 \\ 5+6 &= 11 \\ 5+8 &= 13 \end{aligned}$$

$$\frac{5}{7} - \frac{4}{7} = \frac{25}{49} - \frac{16}{49} = \frac{9}{49}$$

$$\frac{5}{7} / 1/2 = 1.75$$

9) B ✓

X

$$x = 0.8$$

$$x = 0.8$$

10) D ✓

X X |||

$$8+7 = 15$$

$$\frac{5}{7} - \frac{4}{7} = \frac{25}{49} - \frac{16}{49} = \frac{9}{49}$$

$$x = 0.8$$

11) D ✗ C

* X

$$8+6 = 14$$

$$\frac{5}{7} - \frac{4}{7} = \frac{25}{49} - \frac{16}{49} = \frac{9}{49}$$

$$x = 0.8$$

12) B ✗ A

$\sum_{i=1}^n i = \frac{n(n+1)}{2}$

$$\frac{4}{3} = \frac{1}{2} \cdot \frac{2}{3} = 6$$

$$\frac{210}{14} = \frac{42}{2} = 21$$

$$\sqrt{14^2} = 14$$

13) E ✓

$= \sum_{i=1}^{20} i$

$$\frac{1}{2} = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$\sqrt{14^2} = 14$$

14) E ✓

$i = n+1$

$$\frac{7}{2} = \frac{7}{2} \cdot \frac{1}{2} = \frac{3}{8}$$

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$\sqrt{14^2} = 14$$

15) C

$\sum_{i=n+1}^{20} i = \sum_{i=1}^{20} i$

$$- \sum_{i=1}^n i$$

$$n(n+1) = 210$$

$$n^2 + n - 210 = 0$$

$$(n+15)(n-14) = 0$$

$$n = 14, n = -15$$

16) A

$\frac{20(21)}{2} = n(n+1)$

$$- \sum_{i=1}^n i$$

$$210 - n(n+1)$$

$$n = 14$$

$$\sqrt{14^2} = 14$$

H lies
D lies
H lies
D lies

~~Sunday:~~
 \rightarrow Sunday

1,1,1
1,1,2
1,2,1
1,2,2
2,1,1
2,1,2
2,2,1
2,2,2

17) C ✓

Friday:
 \rightarrow Thursday

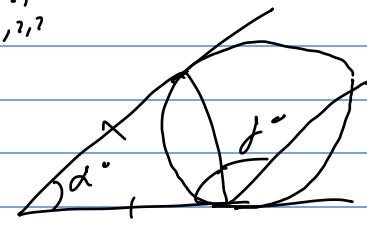
18) C x D

D true ✓

19) A

$$J = \frac{10 + 22 + y}{2} = 16 + \frac{y}{2}$$

$$\frac{180 - d}{2}$$



20) E

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)} + \frac{180-p}{2}$$

21) C

$$88 = \sqrt{\dots}$$

$$p^o = 180 - \frac{a+b}{2}$$

22) B ✓

$$88^2 = (16 + \frac{y}{2})(16 + \frac{y}{2} - 10) = (16 + \frac{y}{2} - 7)(16 + \frac{y}{2} - y) = (16 + \frac{y}{2})(6 + \frac{y}{2})(-6 + \frac{y}{2})(16 - \frac{y}{2}) = (16^2 - (\frac{y}{2})^2)((\frac{y}{2})^2 - 6^2) = 256$$

23) D

$$f(10) = 14$$

$$f(2 \cdot 5) = f(2) + f(5) = 14$$

$$y = 8\sqrt{5}$$

$$f(4 \cdot 10) = f(4) + f(10) \quad 88^2 = 44 \cdot 2^2 \quad 88^2 = (16^2 - (4\sqrt{5})^2)((4\sqrt{5})^2 - 6^2)$$

24) C ✓

$$f(4 \cdot 10) = f(4) + f(10) \quad 88^2 = 44 \cdot 2^2 \quad : (256 - 80)(80 - 36)$$

$$= 2^2 \quad = 44 \cdot 44 \cdot 4 = 176 \cdot 44$$

$$f(4) + 14 = 20 \quad 44 \cdot 4 = 176 \quad \checkmark$$

$$\text{Marks} = (13 \times 4) - 4 + 25 \Rightarrow f(4) = 6$$

$$= 14^2 = 196$$

$$= 52 + 21$$

$$f(4) = f(2 \cdot 2) = f(2) + f(2) = 6$$

$$= 14^2 = 196$$

$$= \boxed{73} \\ \boxed{125}$$

$$\Rightarrow f(2) = 3$$

$$6^2 = 36 = 6 \times 2 \times 3$$

$$3 + f(5) = 14$$

$$256^2 = 16^4 = 16 \cdot 16 \cdot 16 \cdot 16$$

$$\Rightarrow f(5) = 11$$

$$= 2 \cdot 8 \cdot 4 \cdot X$$

$$f(5 \cdot 0) = f(5 \cdot 1 \cdot 0)$$

$$36^2 = (2^2 \cdot 3 \cdot 9)^2$$

$$= f(5) + f(100)$$

$$= 2^6 \cdot 3^2 \cdot 9^2$$

$$= f(5) + f(10) + f(10)$$

$$= 2^2 \cdot 2^2 \cdot 8 \cdot 3 \cdot 9 \cdot 4$$

$$= 11 + 14 + 14$$

$$= 8 \cdot 9 \cdot 10 \cdot 2 \cdot 5 \cdot 3 \cdot 6$$

$$= 11 + 28 = \underline{\underline{39}}$$

9876

1111

1112

1121

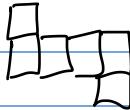
1122

1211

1212

1221

1222



1

2

\square : side length = $r+1$

diagonal = 2

$$= \sqrt{2(r+1)^2}$$
$$= \sqrt{2}(r+1)$$

$$r+1 = \frac{2}{\sqrt{2}} = \sqrt{2}$$

$$r+1 = \sqrt{2}$$

$$r = \sqrt{2} - 1$$

$$\sqrt[5]{2^{615}}$$

$$31^2 = (2r+1)^2$$

$$2015 = 5 \cdot 403 = \frac{900+601}{961} = 5 \cdot 13 \cdot 31$$

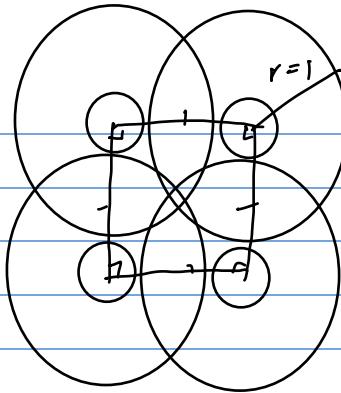
Solutions

3) $\frac{4}{5} \rightarrow \frac{5}{4}$

$0.8 \rightarrow 1.25$

diff = 4.5

$$\frac{4.5}{0.8} = 4.5 \times \frac{10}{8} = \frac{45}{8}$$



$$f(2015)$$

$$= 2015 + \sqrt{1158} + \dots$$

$$\frac{39}{40}$$

$$196$$

$$= 2015 + \sqrt{1158} + \frac{1}{2015 - \sqrt{1158}} 25 + 169 + 961$$

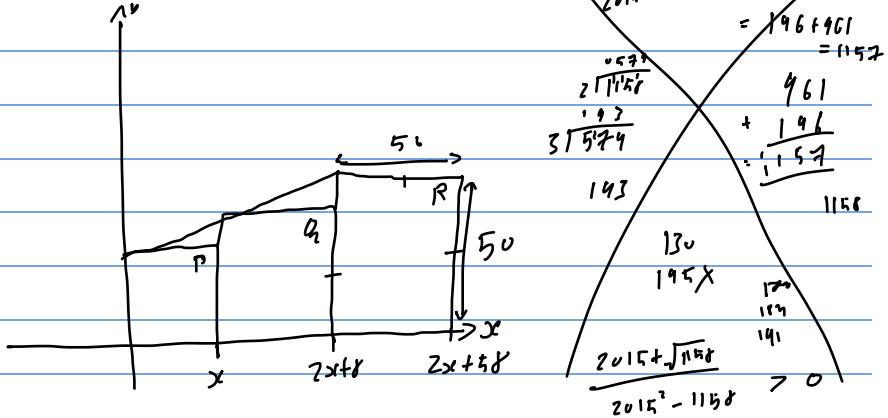
$$= 196 + 961$$

$$= 1157$$

$$961$$

$$+ \frac{196}{1157}$$

$$1158$$



$$y = m x + c$$

$$x = 2015 :$$

$$\sqrt{x^2 + 1} > x > 0$$

$$x - \sqrt{x^2 + 1} < 0$$

$$= \frac{8}{x + 8}$$

$$\frac{1}{x + \sqrt{x^2 + 1}} < 0$$

$$y = \frac{8x}{x+8} + c$$

$$x + \sqrt{x^2 + 1} \approx 22$$

$$50 = \frac{8(2x + \delta)}{x + \delta} + \frac{x + \delta}{x + \delta}$$

$$x + \sqrt{x^2 + 1} \approx 22$$

$$\frac{16x + 16\delta + x + \delta}{x + \delta} \frac{x^2 - x^2 - 1}{x + \sqrt{x^2 + 1}} = -x - \sqrt{x^2 + 1}$$

$$f(x) = 0$$

$$50 = \frac{17x + 44\delta}{x + \delta}$$

$$x = \frac{58}{8}$$

$$50 \cdot 17x + 44\delta = 17x + 44\delta = \frac{6}{4} 64$$

$$37x = 72x$$

