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HUA YI SECONDARY SCHOOL

4E

Preliminary Examination 2022

4E

MATHEMATICS

4048/1

Paper 1

2022
2 h

Candidates answer on the Answer Space provided.

Mark Scheme

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[Turn Over]

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1.

$$2^{1000}(1 + 2^3) \text{ ----M1 factorise}$$

$$= 2^{1000} \times 3^2$$

$$m = 1000, \quad n = 2 \text{ ----A2}$$

2.

(a)

$$6 \text{ ----B1}$$

(b)

$$30 - 3n \text{ ----B1}$$

(c)

No as -31 is not a divisible by 3, or we will get $n = 20.3$, but n must be a whole number. -----B1

3.

(a)

$$AB = DC \text{ (Given) (S)}$$

$$AC = DB \text{ (Given) (S)}$$

$$BC = CB \text{ (S) common side} \quad \text{M1}$$

$$\text{Hence } \triangle ABC \text{ is congruent to } \triangle DCB. \text{ (SSS) } \quad \text{A1}$$

(b)

$$\text{Since } \triangle ABC \text{ is congruent to } \triangle DCB, \angle DBC = \angle ACB \quad \angle DBC = \angle ACB .$$

Hence triangle TBC is an isosceles triangle. ----B1

4.

$$(a) \quad 450 = 2 \times 3^2 \times 5^2 \text{ ----B1}$$

(b)

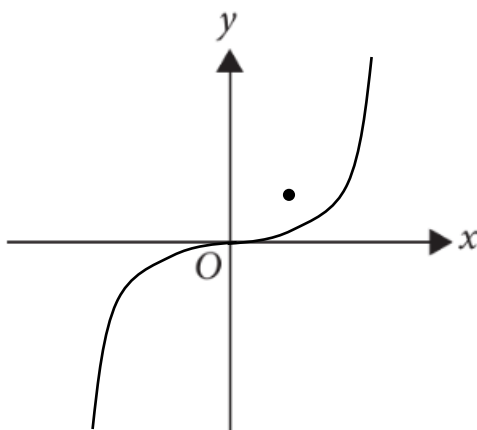
$$45 \text{ ----B1}$$

(c)

$$147 \text{ ---B1}$$

5.

B1 – curve A1 below the point (If curve is wrong then 0)



6.

$$-3y = 3/5 \text{ -----M1 (convert } 1/7 \text{ to } 7^{-1} \text{)}$$

$$y = -1/5 \text{ -----A1}$$

7.

$$\begin{aligned} \frac{25q^2}{4p^6} \times \frac{4}{p^{-7}q} & \text{---- M1} \\ = \frac{25q}{p^{-1}} & \\ = 25pq & \text{---- A1} \end{aligned}$$

8.

$$-0.6 \leq x < 0.8 \text{ ----- B1}$$

9.

$$4x + 3 \geq -10 \text{ ---- M1}$$

$$x \geq -3.25 \text{ ---- A1}$$

10.

(a)

$$v = \frac{4}{3} \text{ ---B1}$$

(b)

$$9v^2 = 25 - x^2 \text{ ----M1}$$

$$x^2 = 25 - 9v^2 \text{ ----M1}$$

$$x = \pm\sqrt{25 - 9v^2} \text{ -----A1(A0 if no } \pm \text{)}$$

11.

$$9n^2 + 6n + 1 + 2 \text{ ----M1}$$

$$3(3n^2 + 2n + 1) \text{ ----A1}$$

12.

(a)

$$\frac{3}{5} \times \frac{1}{3} \times \frac{1}{4} = \frac{1}{20} \text{ ----B1}$$

(b)

$$1 - \frac{2}{5} \times \frac{1}{3} \times \frac{1}{4} \text{ ----M1}$$

$$= \frac{29}{30} \text{ ----A1}$$

13.

(a)

Ans:

$$\begin{aligned}\angle BAC &= \angle ADB(A)(\text{Given}) \\ \angle ABC &= \angle ABD(A)(\text{common})\end{aligned}\quad \text{-----M1}$$

Hence

triangle ABC is similar to triangle DBA. (AA) -----A1

(b)

$$\begin{aligned}\frac{7}{5+CD} &= \frac{5}{7} \text{----M1} \\ CD &= 4.8 \text{----A1}\end{aligned}$$

14.

a.

$$\begin{aligned}\frac{V_{small}}{V_{big}} &= \frac{1}{8} \\ \frac{H_{small}}{H_{big}} &= \frac{1}{2} \text{----M1} \\ H_{big} &= 10 \text{----A1}\end{aligned}$$

b.

$$\begin{aligned}\frac{A_{small}}{A_{big}} &= \frac{1}{4} \\ A_{small} &= \frac{1}{4} \times 26 = 6.5 \text{----A1}\end{aligned}$$

- c. Disagree – because the mass of the cups is equal to mass of the paper. Thus the ratio of their mass should be equal to the ratio of their areas. Mass of big cup should be 4 times that of mass of small cup.

15.

$$\begin{aligned}\text{Sum of the three equal interior angles} &= 375 \text{-----M1} \\ \text{One interior angle} &= 125 \text{-----M1} \\ x &= 235 \text{----A1}\end{aligned}$$

16.

$$\begin{aligned}\angle ABC &= 68 - 19(\text{corresponding angles}) \text{--M1} \\ &= 49 \\ \angle ACB &= 49(\text{isos.}\Delta) \text{-----M1} \\ \angle CDA &= 24.5(\text{exterior angle, iso}\Delta) \text{--A1}\end{aligned}$$

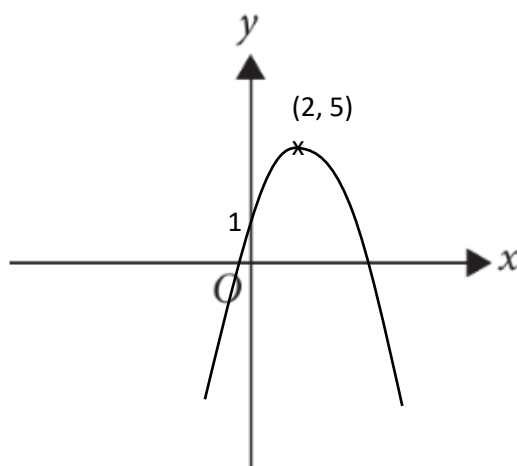
17.

$$r = 0.4, n = 5 \text{ -----B1 each}$$

18. (a)

Symmetrical curve -----A1

Coordinates of turning point and y intercept ----A1



(b)

The maximum point is (2, 5). The maximum value of y is 5. Hence there will be no solution if y is more than 5. ----B1

or

$y = 7$ do not the intersect the graph.

[1]

19. (a)

$$3(9x^2 - 4) \text{ --- M1}$$

$$3(3x - 2)(3x + 2) \text{ --- A1}$$

Ans: _____ [2]

(b)

$$\frac{5}{3(3x-2)(3x+2)} - \frac{2}{(3x-2)} \text{ -----M1}$$

$$= \frac{5}{3(3x-2)(3x+2)} - \frac{2(3)(3x+2)}{3(3x-2)(3x+2)} \text{ ---M1}$$

$$= \frac{-7-18x}{3(3x-2)(3x+2)} \text{ --- A1}$$

20. Let the fraction be $\frac{x}{x+3}$.

$$\frac{x+1}{x+3+1} = \frac{7}{8} \text{-----M1}$$

$$8x+8 = 7x+28 \text{-----M1}$$

$$x = 20$$

$$\text{Ans : } \frac{20}{23} \text{-----A1}$$

21.

a)

$$\overrightarrow{QR} = \overrightarrow{QP} + \overrightarrow{PR} = \begin{pmatrix} -2 \\ 3 \end{pmatrix} + \begin{pmatrix} -3 \\ 9 \end{pmatrix} = \begin{pmatrix} -5 \\ 12 \end{pmatrix} \text{-----M1}$$

$$\text{Length of QR} = 13 \text{ units -----A1}$$

$$\text{b) } P(-2, 8) \text{-----B1}$$

22.

(a)

$$\{7\} \in C \quad B \cup C = \{4\} \quad \{9\} \subset B \quad A \cap B = \{\phi\} \quad 5 \notin A' \quad [2]$$

(b)

$$\{4\} \text{-----B1}$$

(c)

The elements in set B are perfect squares less than 10. -----B1

23. (a)

3, 6, 8, 9, 9,

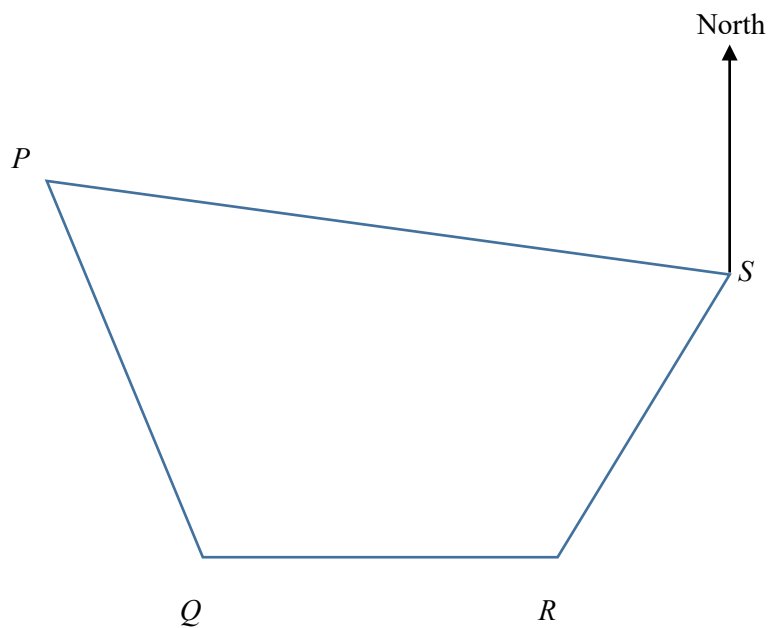
B1 for getting 3, 6, B1 for getting 8,9,9

(b)

He is wrong as there are different number of boys and girls. -----A1

$$\frac{5(68) + 8(55)}{13} = 60 \quad \text{-----A1}$$

24.



25.

(a)

$$1200 \div 1.6 = 750$$

(b)

On 23rd : \$1.5775 = 1 euro

$$1200 \text{ euro} = \$1893 \text{ -----(Least)}$$

On 10th / 12th , \$1.605 = 1 euro

$$1200 \text{ euro} = \$1926 \text{ (greatest)}$$

$$\text{Difference} = \$33 \text{ -----A1(Difference)}$$