TANJONG KATONG SECONDARY SCHOOL
End-of-Year Examination 2021
Secondary 1

CANDIDATE NAME			
CLASS		INDEX NUMBER	

MATHEMATICS 4048/02

Paper 2 **1 October 2021**

1 hour 15 minutes

Additional Materials: Writing Paper
Graph Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 50.

1 The first four terms of a sequence are 33, 26, 19 and 12.

(a) Write down the seventh term of the sequence. [1]

(b) Write down an expression, in terms of n, for the nth term of the sequence. [1]

(c) Determine, with a reason, if the number -206 is in the sequence. [2]

2 **(a)** Find the smallest possible value of a whole number if it leaves a remainder of 3 when divided by 5, 6 or 9. [2]

(b) For a charity event, a group of student leaders has to pack 252 bread rolls and 210 packets of biscuit equally into identical goodie bags with no leftover. Find the largest possible number of goodie bags that can be packed.
[2]

3 **(a)** Solve the inequality $6x - 40 < -2x - 7 \leq 4x + 2$. [3]

(b) Illustrate the solution on a number line. [1]

(c) State the smallest prime value of x that satisfies the inequality. [1]

4 **(a)** Given that $1 \leq x \leq 7$ and $-5 \leq y \leq 3$ find

(i) the greatest possible value of $x - y$, [1]

(ii) the smallest possible value of y^2. [1]

(b) By showing your working clearly, estimate the value of $\dfrac{42100}{2.95 \times 996}$, correct to one significant figure. [2]

(c) Simplify

(i) $6x - \dfrac{2(3-11x)}{5}$, [3]

(ii) $\dfrac{4v^2}{u^3} \div \sqrt[3]{\dfrac{216v^9}{27u^{12}}}$. [2]

5 Andy bought 40 pencils for x cents.
If he buys erasers using the same amount of money, he would have 10 erasers more than pencils.

(a) Express the cost of one pencil in terms of x. [1]

(b) Express the cost of one eraser in terms of x. [1]

(c) An eraser costs 5 cents less than a pencil.
(i) Write down an equation in terms of x to represent this information. [1]
(ii) Solve the equation and find the cost of one pencil. [2]

6 Answer the whole of this question on a sheet of graph paper.

The values of x and y shown in the table below are related through a straight line.

x	-1	0	1	2
y	8	5	2	-1

(a) Using a scale of 2 cm to 1 unit on the y-axis and 4 cm to 1 unit on the x-axis, plot the points given in the table above and join them with a straight line. [3]

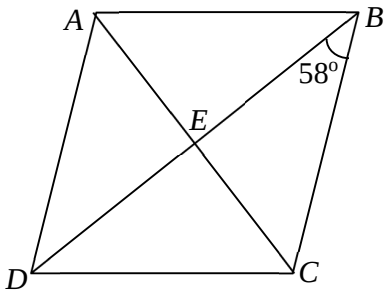
(b) The point $(-0.5, d)$ lies on the graph. Use your graph to find the value of d. [1]

(c) Using your graph, find the

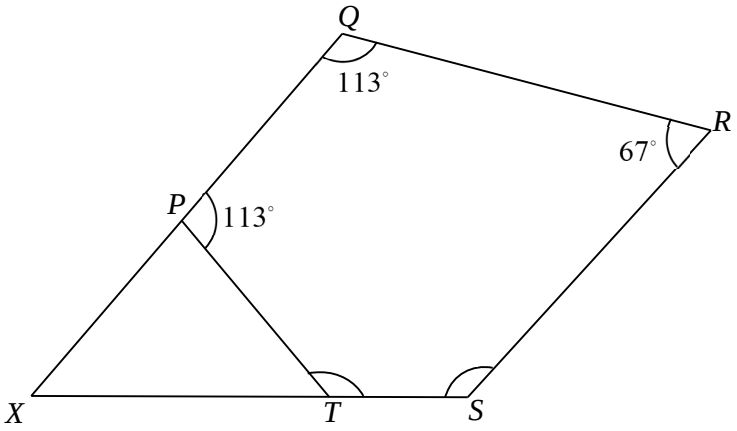
(i) gradient of the line, [2]

(ii) equation of the line. [1]

7 (a) *ABCD* is a rhombus and *E* is the intersection of the two diagonals.
Given that $\angle CBD = 58^\circ$, find angle *DAE*, stating your reason(s) clearly. [2]



(b) *PQRST* is a pentagon in which $\angle PQR = \angle QPT = 113^\circ$, $\angle QRS = 67^\circ$.
$\angle RST = \angle PTS$. *QP* and *ST* produced meet at *X*.



(i) Calculate $\angle PTS$. [2]

(ii) Explain whether *PQ* is parallel to *SR*. [1]

(iii) Prove that triangle *PXT* is an isosceles triangle.
Showing your working and reasons clearly. [2]

8 Concrete solid barriers are used for guiding traffic and securing property from automobile traffic. Figure 1 shows a concrete traffic control barrier.

Figure 1

The barrier can be modelled by a prism with uniform cross section of length 3 m, as shown in Figure 2. The sloping sides *PQAB* and *SRDC* are rectangles.

The uniform cross-section of the prism is made up of a trapezium *PQRS* and a semi-circle with diameter *RQ*.
The perpendicular height between *RQ* and *SP* is 0.5 m.
RQ = 0.2 m and *SP* = 0.6 m. *SR* = *PQ* = 0.7m.

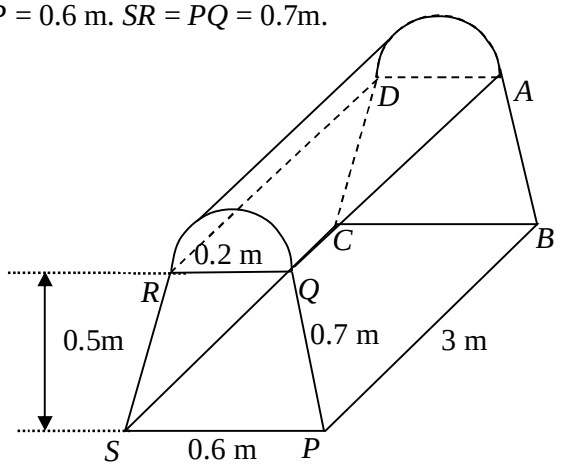


Figure 2

(a) (i) Show that the cross-sectional area of the barrier is 0.2157 m^2, correct to 4 significant figures. [2]

(ii) Hence, calculate the volume of the barrier. [1]

(b) A builder wanted to paint the entire structure excluding the **base**.
A tin of paint can paint an area of 20 m^2.
Find the maximum number of structure(s) that can be painted with 3 tins of paint. [4]

(c) The density of the structure is 2.35 g/cm^3.
The builder's lifting gear can lift a maximum load of 900 kg.
Is it safe for the lifting gear to be used to lift the barrier? [2]
Justify your decision by showing your working clearly.

End of Paper

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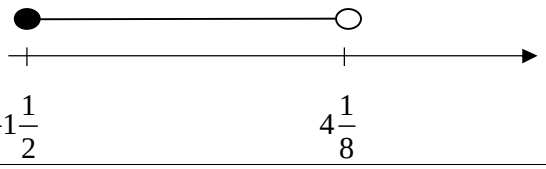
Qn	Answer
1(a)	-9
1(b)	$40-7n$
1(c)	$n=35\frac{1}{7}$ Since n is not an integer / whole number/ natural number / not a multiple of n, -206 is not in the sequence. / 246 is not a multiple of 7
2(a)	93
2(b)	42
3(a)	$-1\frac{1}{2}\le x<4\frac{1}{8}$
3(b)	 $-1\frac{1}{2}$ $4\frac{1}{8}$
3(c)	2
4(a) (i)	12
4(a) (ii)	0
4(b)	10
4(c)(i)	$\frac{52x-6}{5}$
4(c)(ii)	$\frac{2u}{v}$
5(a)	$\frac{x}{40}$
5(b)	$\frac{x}{50}$
5(c)(i)	$\frac{x}{40}-\frac{x}{50}=5$
5(c)(ii)	$x=1000$, 25 cents
6(b)	$d=6.5$
6(c)(i)	-3
6(ii)	$y=-3x+5$
7(a)	32^{o}
7(b)(i)	123.5°

7(b)(ii)	*PQ* is parallel to *SR* because interior angles.
7(b)(iii)	Since two angles of the triangles / angle *PTX* = angle *PXT* are equal, triangle *PXT* is an isosceles triangle.
8(a)(ii)	$0.647 m^3$
8(b)	10
8(c)	1520.685 kg Since weight of barrier is more than the maximum load of the lifting gear, it is not safe for the lifting gear to lift the barrier.