St. Stephen's Girls' College
Final Examination 2017-2018

Form 1   **VC, LHK, KAL, LL, CYN**
179 students   **MATHEMATICS**
Paper I
Time Allowed: 1 hour 30 minutes

Class: _____ Class No.: _____ Division: _____ Name: _____

Please read the following <u>instructions</u> very carefully.

1. Write your class, class number, name and division in the spaces provided on this cover.

2. This paper carries 100 marks. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question/Answer Paper.

3. *ALL* working must be clearly shown.

4. The diagrams in this paper are not necessarily drawn to scale.

For Markers' Use Only		For Markers' Use Only	
Question No.	**Marks**	**Question No.**	**Marks**
1	(5)	**9**	(9)
2	(4)	**10**	(5)
3	(5)	**11**	(9)
4	(10)	**12**	(8)
5	(5)	**13**	(7)
6	(3)	**14**	(7)
7	(11)	**15**	(7)
8	(5)	**Total**	(100)

1. The height H cm of a plant after n years can be calculated by the formula $H = \dfrac{120n}{n+3}$.

    (a) Find the height of the plant after 6 years.   (2 marks)

    (b) If $H = 90$, find n.   (3 marks)

2. Mary has distributed at least 130 sweets to n boys and $(n - 3)$ girls. Each boy gets 4 sweets and each girl gets 6 sweets.

    (a) Use an inequality to represent the above situation.   (2 marks)

    (b) Write down two possible values of n.   (2 marks)

3. Solve the equation $\dfrac{2x-1}{2} - \dfrac{x+7}{10} = \dfrac{3x+6}{5}$. (5 marks)

4. The figure shows a pie chart representing the monthly expenditure of Mr. Wong. It is given that he spends $7 800 on food and $9 000 on rent in a month.

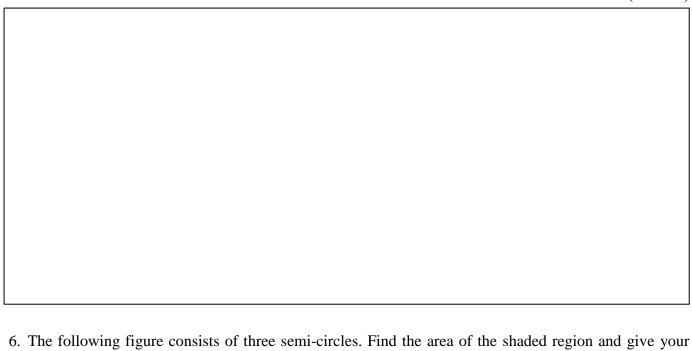<div align="center">Monthly Expenditure of Mr. Wong</div>

(a) Find the total monthly income of Mr. Wong.   (3 marks)

(b) Find the values of x and y.   (5 marks)

(c) What percentage of Mr. Wong's monthly income is his spending on food? (2 marks)

5. Listed below are the sizes (in sq. ft.) of 15 different flats in a newly developed residential building:

311	333	300	315	350
338	350	306	342	339
308	314	347	314	340

Use 10 sq. ft. as the stem and 1 sq. ft. as the leaf, construct a stem-and-leaf diagram to present the above data.   (5 marks)

6. The following figure consists of three semi-circles. Find the area of the shaded region and give your answer correct to 1 decimal place.   (3 marks)

6 cm   6 cm

7. Prism *A* is a metal block in the shape of a rectangular prism. It is melted and recast to form another prism *B*. The base of prism *B* is a right-angled triangle.

Prism *A*

Prism *B*

(a) (i)   Find the volume of prism *A*.   (2 marks)
    (ii) Find the value of *h*.   (2 marks)
(b) (i)   Find the total surface area of prism *A*.   (2 marks)
    (ii) Find the length of *BC*.   (2 marks)
    (iii) Do prism *A* and prism *B* have equal total surface area? Explain your answer.   (3 marks)

8. In the figure, $\triangle ABC$ is a right-angled triangle.
   (a) Draw the image $\triangle A_1B_1C_1$ after reflecting $\triangle ABC$ in the straight line L_1. (2 marks)
   (b) Draw the image $\triangle A_2B_2C_2$ after rotating $\triangle ABC$ clockwise about O through $180°$. (2 marks)
   (c) According to the sizes of its angles, what kind of triangle is $\triangle A_1C_1C_2$? (1 mark)

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9. In the figure, the coordinates of the points *A* and *B* are (–5, 3) and (–5, 4) respectively. *A* is rotated clockwise about the origin *O* through 270° to *P*. *B* is translated 8 units to the right and then translated 9 units downwards to *R*.
   (a) Find the coordinates of *P* and *R*. (3 marks)
   (b) If *P* undergoes a transformation to *R*, describe the transformation. (2 marks)
   (c) Find the area of Δ*OPR*. (2 marks)
   (d) *Q* and *S* are two points in the rectangular coordinate plane such that *PQRS* has more than one axis of symmetry. Write down a possible set of coordinates for *Q* and *S*. (2 marks)

10. The figure shows a polar coordinate plane. Denote O as the pole. The coordinates of a point S are $(5, 200°)$.
    (a) Plot S in the polar coordinate plane.   (1 mark)
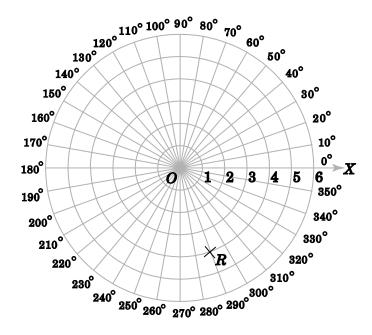   (b) Write down the coordinates of R.   (1 mark)
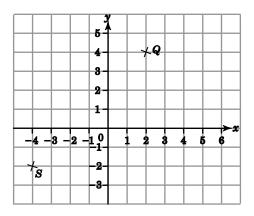   (c) According to the sizes of its angles, what kind of triangle is ΔORS? Explain your answer.
                                                                                (3 marks)

11. The figure shows a rectangular coordinate plane. $P(-4, 3)$, $Q(2, 4)$, $R(5, -3)$ and $S(-4, -2)$ are four points in the rectangular coordinate plane.

(a) *QS* intersects the *y*-axis at *N*. Write down the coordinates of *N*.   (1 mark)
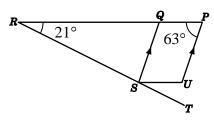
(b) Draw the quadrilateral *PQRS*.   (3 marks)

(c) Find the area of *PQRS*.   (3 marks)
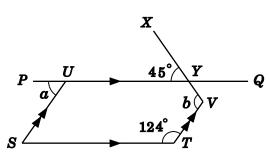
(d) Let *M* be the point of intersection of the diagonals of *PQRS*. Mark *M* in the rectangular coordinate plane and write down the coordinates of *M*.   (2 marks)

12. In the figure, *RQP* and *RST* are straight lines. It is given that $\angle QSU = 3\angle UST$, *QS* // *PU*, $\angle R = 21°$ and $\angle P = 63°$.

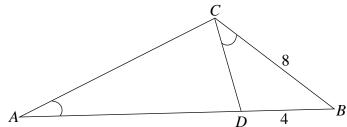(a) Find $\angle UST$.   (5 marks)

(b) Is *QP* parallel to *SU*? Give reasons.   (3 marks)

13. In the figure, *XYV* and *PUYQ* are straight lines. It is given that *PQ* // *ST* and *SU* // *TV*. Find *a* and *b*.
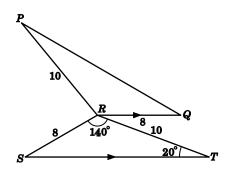
(7 marks)

14. In the figure, D is a point on AB. It is given that $\angle CAD = \angle BCD$, $BC = 8$ and $BD = 4$.

   (a) Prove that $\triangle ABC \sim \triangle CBD$.   (3 marks)

   (b) Find the length of AD.   (4 marks)

15. In the figure, *RQ // ST*. It is given that $\angle PRT = 160°$.

(a) Find $\angle PRQ$.   (3 marks)

(b) Is it true that $\Delta PRQ \cong \Delta TRS$? Give reasons.   (4 marks)

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