St. Stephen's Girls' College
Final Examination 2020-2021

Form 2 **LHK, KAL, SCHL, YLN**
166 students

MATHEMATICS
Paper I
Time Allowed: 1 hour 30 minutes

Name: _____ No.: _____

Class: _____ Division: _____

Instructions:

- *Attempt **ALL** questions.*
- *Write your answers in the spaces provided in this **Question-Answer Paper**.*
- ***ALL** working must be clearly shown.*
- *The diagrams in this paper are not necessarily drawn to scale.*
- *This paper carries 100 marks.*
- *Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.*

Question No.	Marks
1	/6
2	/6
3	/7
4	/6
5	/5
6	/5
7	/5
8	/5
9	/4

Question No.	Marks
10	/9
11	/4
12	/6
13	/3
14	/3
15	/6
16	/7
17	/4
18	/9
Total:	

1. (a) (i) Expand $(x+3y)^2$. (2 marks)

(ii) Expand $(2x+5y)(x-y)$. (2 marks)

(b) Hence or otherwise, simplify $2(x+3y)^2-3(2x+5y)(x-y)$. Express your answer in descending powers of x. (2 marks)

2. (a) Factorize $x^3+x^2y-7x^2$. (1 mark)

(b) Expand $(x+1)(x-1)$. (1 mark)

(c) Using the result of (a) and (b), factorize $x^3+x^2y-7x^2-x-y+7$. (4 marks)

3. It is given that $(x-8)(x+p)-6 \equiv (x-9)^2+q$, where p and q are constants. Find the values of p and q. (7 marks)

4. A lion is chasing after a rabbit. They are 525 m apart.
It is given that a lion can run 3.6 km in 4 minutes.
   (a) Find the running speed of the lion in m/s. (3 marks)
   (b) If the rabbit runs at 8 m/s, how many second does it take for the lion to catch the rabbit? (3 marks)

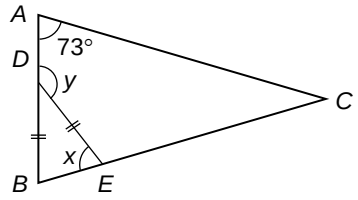
5. If $x:y=3:4$ and $y:z=6:5$, find

(a) $x:z$, (2 marks)

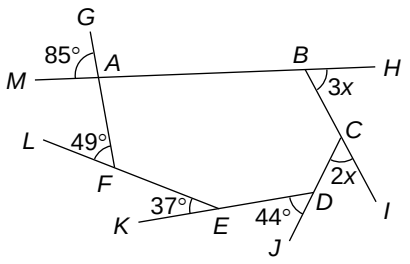
(b) $(7x-z):(z+2x)$. (3 marks)

6. Two years ago, the age of Dennis was 9 times that of his son. Three years later from the present, the age of Dennis will be 4 times that of his son. Find the present age of Dennis and present age of his son. (5 marks)

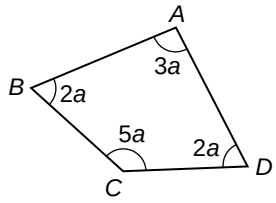
7. In the figure, D and E are points on AB and BC respectively such that $BD = DE$. $\angle DAC = 73°$ and $AC = BC$. Find x and y. (5 marks)



8. In the figure, $ABCDEF$ is a hexagon with its sides produced. $\angle GAM = 85°$, $\angle JDK = 44°$, $\angle KEL = 37°$ and $\angle LFG = 49°$. Find x. (5 marks)

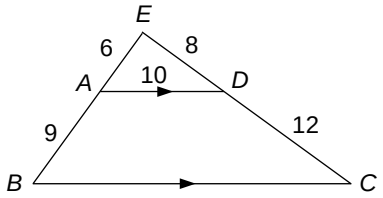


9. In the figure, *ABCD* is a quadrilateral. Find the greatest interior angle of *ABCD*.



(4 marks)

10. In the figure, $ABCD$ is a trapezium, where $AB = 9$, $AD = 10$ and $CD = 12$. BA and CD are produced to meet at E, where $AE = 6$ and $DE = 8$.



(a) Show that ΔADE is a right-angled triangle. (3 marks)

(b) Find the area of the trapezium $ABCD$. (2 marks)

(c) Find the height of the trapezium $ABCD$. (4 marks)

11. Simplify $\frac{125^{x+y}}{25^x \times 5^y}$. (4 marks)

12. Consider the formula $\frac{h}{6} - \frac{1-k}{3} = k + 2$.

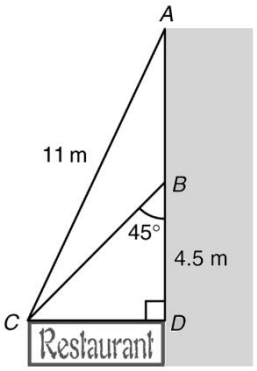
(a) Make k the subject of the formula above. (4 marks)

(b) If the value of h is decreased by 4, find the change in the value of k. (2 marks)

13. Simplify $\sqrt{6} \times \frac{7}{\sqrt{12}}$ and rationalize the denominator. (3 marks)

14. It is given that $\sin\theta = \frac{8}{17}$. Without using a calculator, find the values of $\tan\theta$ and $\cos\theta$. (3 marks)

15. In the figure, two metal wires AC and BC are used to fix the position of a signboard CD on a vertical wall. It is given that the length of metal wire AC is 11 m, $BD = 4.5$ m and $\angle CBD = 45°$.



(a) Find the length of the metal wire BC. (2 marks)

(b) Find $\angle CAD$. (4 marks)

(Correct your answers to 3 significant figures.)

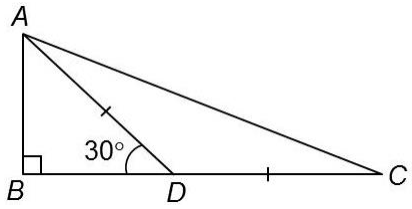
16. Simplify the following expressions.

(a) $(\sin\theta - \cos\theta)^2 - 1$ (3 marks)

(b) $\sin(90° - \theta) + \dfrac{\cos(90° - \theta)}{\tan\theta}$ (4 marks)

17. Prove that $\tan\theta\cos^2\theta \equiv \tan(90° - \theta)\sin^2\theta$. (4 marks)

18. In the figure, $\triangle ABC$ is a right-angled triangle with $\angle ABC = 90°$. D is a point on BC such that $AD = CD$ and $\angle ADB = 30°$.



(a) Given that $\tan 30° = \frac{1}{\sqrt{3}}$. Let $AB = x$, express BD and CD in terms of x. (4 marks)

(b) (i) Find $\angle ACD$. (3 marks)

(ii) Hence, find the value of $\tan 15°$ and leave your answer in surd form if necessary. (2 marks)

End of paper