St. Stephen's Girls' College
Final Examination 2016-2017

Form 2 **LC, WMC, LHK, LL, CYN, MLW**
168 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.*

Question No.	Marks
1	
2	
3	
4	
5	
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7	
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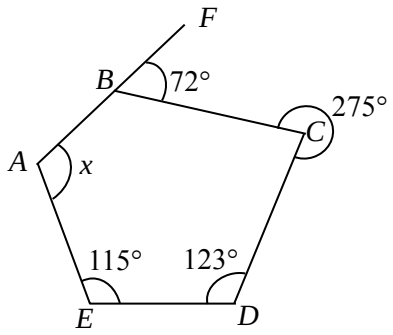
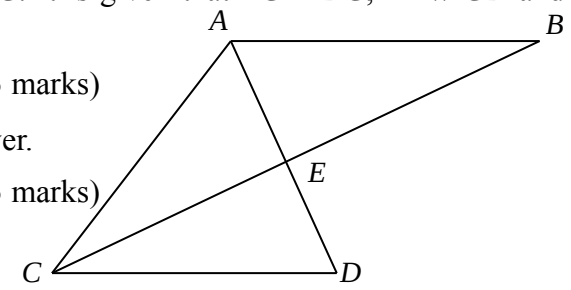
9	

Question No.	Marks
10	
11	
12	
13	
14	
15	
16	
17	
18	
Total:	

1. In the figure, *ABF* is a straight line. Find *x*. (5 marks)



2. In the figure, AD and BC intersect at E and $AD \perp BC$. It is given that $AC = DC$, $AB \parallel CD$ and $\angle CAD = 70°$.

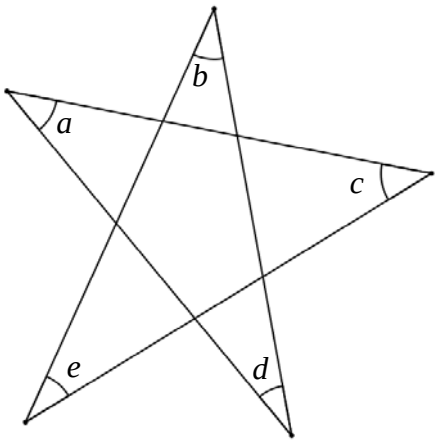


(a) Find $\angle BCD$. (3 marks)

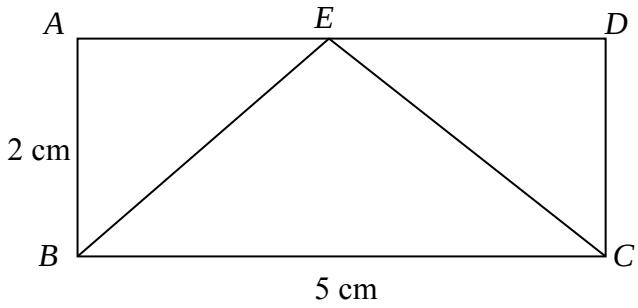
(b) Is ΔABC an isosceles triangle? Explain your answer. (3 marks)

3. The given figure is formed by five straight lines. Find $a + b + c + d + e$.

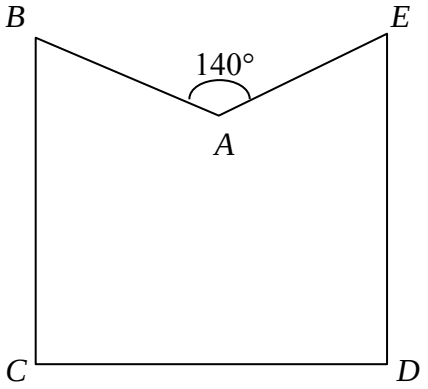
(4 marks)



4. In the figure, *ABCD* is a rectangle. If *E* is a point lying on *AD* such that $\angle ABE = 50°$, find $\angle CED$. (Correct your answer to 3 significant figures.) (4 marks)



5. In the figure, $AB = AE$, $\angle BCD = \angle EDC = 90°$ and $\angle BAE = 140°$. If $BC = CD = DE = 8$ cm, find the perimeter of the pentagon *ABCDE*. (Correct your answer to 3 significant figures.) (4 marks)

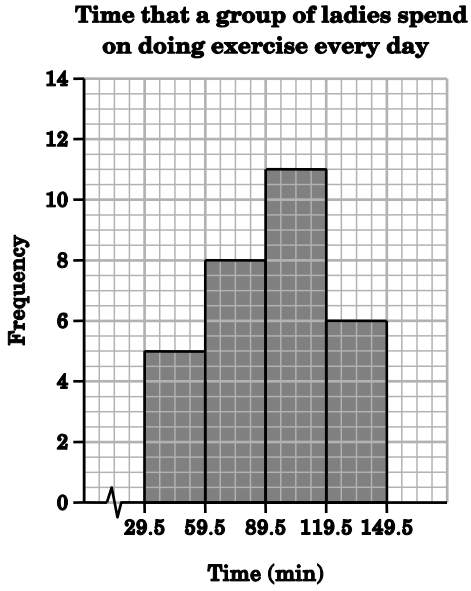


6. (a) Complete the table for the equation $y = -2x + 3$. (2 marks)

x	-2	0	2	5
y				

(b) According to the table in (a), draw the graph of $y = -2x + 3$ on the graph paper provided below. (5 marks)

7. The histogram below shows the distribution of the time that a group of ladies spend on doing exercise every day.



(a) Complete the following frequency distribution table according to this histogram. (4 marks)

Class Boundaries (min)	Class Mark (min)	Frequency

(b) Complete the corresponding cumulative frequency distribution table. (2 marks)

Time less than (min)	29.5				
Cumulative frequency					

(c) What percentage of ladies spend 89.5 min or more on doing exercise every day? (Correct your answer to 3 significant figures.) (2 marks)

8. If $(2a + b) : (3a + 4b) = 2 : 5$, find $a : b$. (3 marks)

9. (a) Rationalize the denominator of $\frac{10}{\sqrt{5}}$. (2 marks)

(b) Hence, simplify $\frac{10}{\sqrt{5}} + 3\sqrt{5}$. (1 mark)

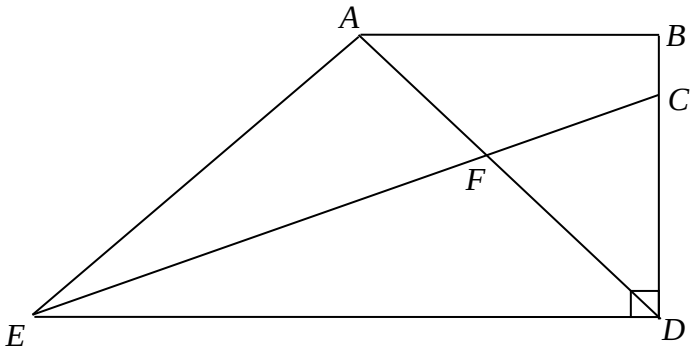
10. It is given that $a = \sqrt{5}$ and $b = \sqrt{7}$. Express $\sqrt{35} + \sqrt{140}$ in terms of a and b. (3 marks)

11. (a) Simplify $2 \sin x + \cos x \tan x$. (2 marks)

(b) Without using a calculator, find the value of $\frac{\tan 60°}{\sin 45°}$ in surd form and rationalize the denominator of your answer if necessary. (3 marks)

12. A building is 44 cm high in a photograph. It is known that the actual height of the building is 96.8 m and the actual width of the building is 15.4 m.
    (a) Find the scale of the photograph in the form 1: *n*. (3 marks)
    (b) Find the width (in cm) of the building in the photograph. (2 marks)

13. In the figure, C is a point on BD. AD and EC intersect at F. $\angle BDE = 90°$, $AB = 48$, $BD = 55$, $AD = 73$, $CE = 125$ and $BC : CD = 1 : 4$.
    (a) Find the length of DE. (3 marks)
    (b) Prove that $\angle ABD = 90°$. (4 marks)
    (c) Find the area of the quadrilateral $ABDE$. (2 marks)

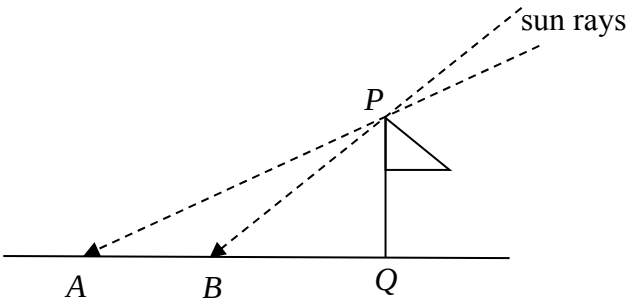


14. In the figure, when sun rays make an angle of 18° with the horizontal ground, AQ is the shadow of a vertical pole PQ. It is known that when sun rays make an angle of 25° with the horizontal ground, the shadow of the pole becomes BQ which is 0.5 m shorter than AQ. Suppose BQ is x m.

(a) By considering ΔPBQ, express PQ in terms of x. (2 marks)

(b) By considering ΔPAQ, express PQ in terms of x. (2 marks)

(c) Hence, find the height of the pole PQ. (Correct your answer to 3 significant figures.) (3 marks)



15. (a) Factorize $8c + 24$. (1 mark)
    (b) Factorize $ac + bc + 3a + 3b$. (2 marks)
    (c) Using the results of (a) and (b), factorize $ac + bc + 3a + 3b + 8c + 24$. (2 marks)

16. (a) Simplify $\frac{1}{a+1} + \frac{1}{b-1}$. (2 marks)
    (b) Make a the subject of the following formula, where $a + b \neq 0$:
    $$\frac{1}{b} + \frac{1}{a} = \frac{1}{b-1} + \frac{1}{a+1}$$
    (4 marks)

17. (a) Prove that $(a + b)^2(a - b)^2 \equiv (a^2 - b^2)^2$. (2 marks)
    (b) Expand $(a^2 - b^2)^2$. (2 marks)
    (c) It is known that $a^2 + b^2 = 10$ and $ab = 3$.
        (i) Find the value of $(a + b)^2$. (2 marks)
        (ii) Hence, or otherwise, find the value of $a^4 - 2a^2b^2 + b^4$. (2 marks)

18. (a) Expand and simplify $(\sin x + \cos x)^2$. (2 marks)

    (b) Expand and simplify $(\sin x - \cos x)^2$. (2 marks)

    (c) Given that $45° < x < 90°$ and $\sin x \cos x = 0.48$, find the value of $\sin x$ by using the results of (a) and (b). (4 marks)

End of Paper