ST. STEPHEN'S GIRLS' COLLEGE

**Final Examination 2019 – 2020**

**Form 2** **LHK, KAL, YLN, MLY**

**174 students**

**Mathematics**

**Time Allowed : 1 hour 15 minutes**

**Question/Answer Paper**

**Please read the following instructions very carefully.**

1. This paper consists of TWO sections, A and B.

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

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

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

| | |
|---|---|
| **Class** | |
| **Class No.** | |
| **Name** | |
| **Division** | |

| **For Markers' Use Only** | |
|---|---|
| 1 – 24. | (58) |
| 25. | (3) |
| 26. | (3) |
| 27. | (6) |
| 28. | (6) |
| 29. | (6) |
| 30. | (6) |
| 31. | (6) |
| 32. | (6) |
| **TOTAL** | (100) |



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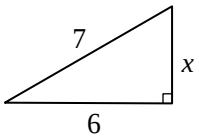
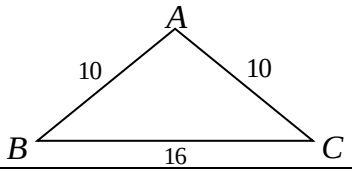
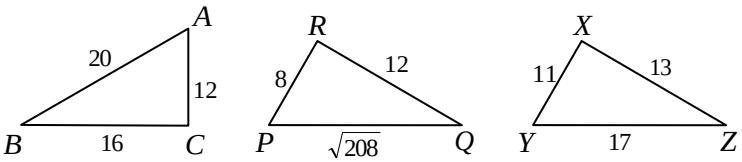
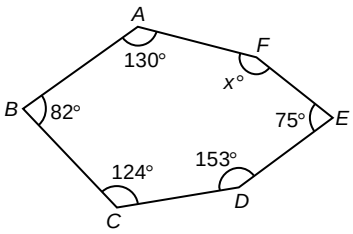
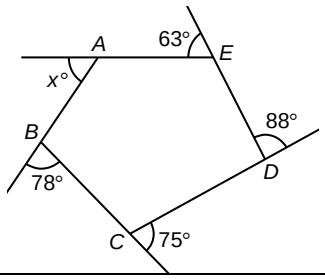
**Section A (58%)**

***All rough work should be done on the rough work paper provided, but will not be marked.***

| | | **Answers** | **Marks** |
|---|---|---|---|
| 1. | Which of the following is/are rational number(s)? $\sqrt{5}$, $\frac{2}{\sqrt{3}}$, $\sqrt{\frac{3}{363}}$, $0.\dot{6}$, $\sqrt{4}-\sqrt{3}$ | 1._____ | 2 |
| 2. | Simplify $\sqrt{50}-\sqrt{18}+\sqrt{8}$. | 2._____ | 2 |
| 3. | Find the value of $x$. (Express your answer in surd form if necessary)   | 3._____ | 2 |
| 4. | Simplify $2\sqrt{21}\times\sqrt{8}\div\sqrt{14}$. | 4._____ | 2 |
| 5. | Find the area of the isosceles triangle $ABC$.   | 5. _____ | 3 |
| 6. | Rationalize the denominator of $\frac{5}{\sqrt{10}}$. | 6. _____ | 2 |
| 7. | Which of the following is/are right-angled triangle(s)? (Write down "Yes" or "No".)   | 7.<br>$\Delta ABC$ : _____<br>$\Delta PQR$ : _____<br>$\Delta XYZ$ : _____ | 1<br>1<br>1 |
| 8. | The figure shows a hexagon $ABCDEF$. Find the value of $x$.   | 8. _____ | 1 |
| 9. | The figure shows the exterior angles of a pentagon $ABCDE$. Find the value of $x$.   | 9. _____ | 1 |

Subtotal: /18



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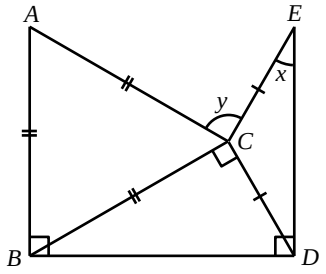
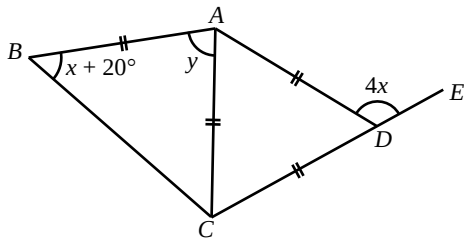
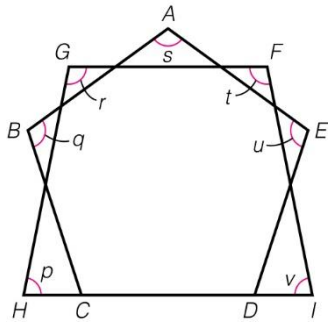
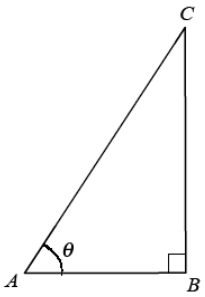
| | | | |
|---|---|---|---|
| 10. | Find the unknowns in the figure below.<br>  <br> | 10.<br>$x =$ _____<br>$y =$ _____ | 2<br>2 |
| 11. | If the size of an exterior angle of a regular polygon is 24°, find the number of sides of the regular polygon. | 11._____ | 2 |
| 12. | In the figure, $AB = AC = CD = AD$. $CDE$ is a straight line. Find the unknowns.<br>  <br> | 12.<br>$x =$ _____<br>$y =$ _____ | 1<br>1 |
| 13. | If each interior angle of a regular polygon is 16° more than that of a regular 9-sided polygon, find the number of sides of the regular polygon. | 13._____ | 3 |
| 14. | In the figure, $ABCDE$ is a regular pentagon and $FGHI$ is a quadrilateral. $p+q+r+s+t+u+v=$<br>  <br> | 14._____ | 3 |
| 15. | In the figure, $AB$ = 3 cm, $AC$ = 7 cm. Find $\theta$. (Correct your answer to 3 significant figures.)<br>  <br> | 15._____ | 2 |

Subtotal: /16



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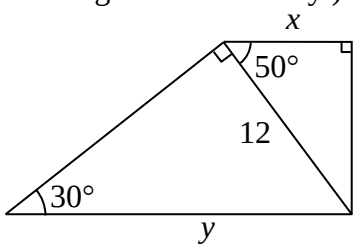
| | | | |
|---|---|---|---|
| 16. | In the figure, find the values of $x$ and $y$.<br>(Correct your answers to 3 significant figures if necessary.)<br>  <br> | 16.<br>$x =$ _____<br>$y =$ _____ | 2<br>2 |
| 17. | Simplify $1-\cos^2\theta-\sin^2\theta$ . | 17._____ | 3 |
| 18. | Simplify $\dfrac{1}{\sin x\cos x}-\dfrac{\sin x}{\cos x}$. | 18._____ | 3 |
| 19. | Solve the equation $\sin\theta=\sqrt{3}\cos\theta$, where $0°\le\theta\le 90°$. | 19. $\theta =$ _____ | 2 |
| 20. | Find the acute angle $\theta$ if<br>$\sin(\theta+15°)=\cos(25°+\theta)$. | 20. $\theta =$ _____ | 2 |
| 21. | Simplify the ratio 2.4 : 0.48. | 21. _____ | 2 |
| 22. | The different plans of mobile phone airtime provided by Apple Telephone Company are as follows:<br><br>Monthly fee / Airtime (min)<br>Plan A : \$89 / 100 min<br>Plan B : \$150 / 180 min<br>Plan C : \$256 / 320 min<br>Plan D : \$369 / 450 min<br><br>Which plan is the cheapest per minute? | 22. _____ | 2 |
| 23. | If $a : b = 3 : 4$ and $a : c = 2 : 3$, find $a : b : c$ . | 23. _____ | 3 |
| 24. | Suppose that 4 US dollars can be exchanged for HK\$30 and 16 Japanese Yen can be exchanged for HK\$1. How many Japanese Yen can be exchanged for 1 US dollars? | 24. _____ | 3 |

Subtotal: /24



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**Section B (42%)**

25. The ratio of the number of basketballs to that of volleyballs and to that of footballs in a bag is 2 : 3 : 5. If there are 9 volleyballs in the bag, find the number of footballs in the bag. (3 marks)



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26. The scale of a map is 1 : 200 000. If the actual length of a highway is 26 km, find the length of that highway on the map in cm. (3 marks)



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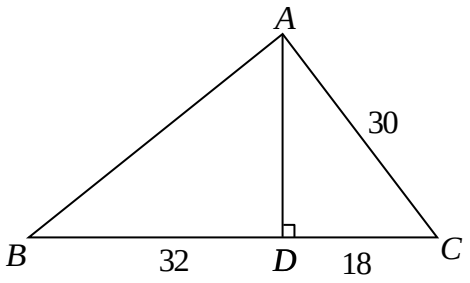
27. In the figure, $BDC \perp AD$.

(a) Find the lengths of $AD$ and $AB$. (3 marks)

(b) Is $\angle BAC$ a right angle? Explain your answer. (3 marks)



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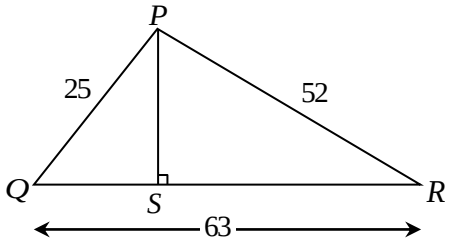
28. In the figure, $PS \perp QSR$. The length of $QR$ is 63. Let $QS = x$.




(a) (i) By considering $\Delta PSQ$, express $PS^2$ in terms of $x$.

(ii) By considering $\Delta PSR$, express $PS^2$ in terms of $x$.

( Hint: $(a-b)^2 = a^2 - 2ab + b^2$ ) (3 marks)

(b) Using (a) and (b), find the length of $PS$. (3 marks)



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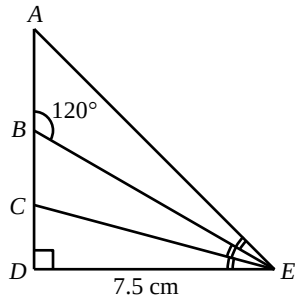
29. In the figure, $ABCD$ is a straight line. $\angle AEB = \angle BEC = \angle CED$.




(a) Find $\angle AEB$. (2 marks)

(b) Find $\angle BAE$. (2 marks)

(c) Find the length of $AD$. (2 marks)



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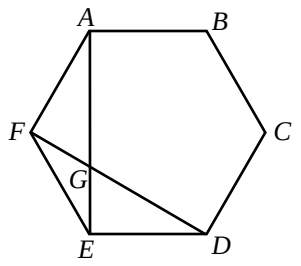
30. In the figure, *ABCDEF* is a regular hexagon.
*AE* and *DF* intersect at *G*.




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

(b) Write down the size of $\angle AEF$. (1 mark)

(c) Find $\angle AGD$. (2 marks)



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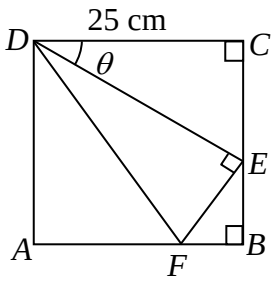
31. The figure shows a square $ABCD$ of side 25 cm. $E$ and $F$ are points on $BC$ and $AB$ respectively. It is given that $CE : EB = 3 : 2$.




(a) Find $\tan\theta$. (2 marks)

(b) (i) Express $\angle BEF$ in terms of $\theta$.

(ii) Hence, find the length of $FB$. (4 marks)



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32. It is given that $\theta$ is an acute angle such that $\dfrac{1}{\tan\theta} = \dfrac{\sin 2\theta}{\cos 2\theta}$. Without using a calculator, find

(a) $\theta$, (3 marks)

(b) the value of $\dfrac{2-\cos^2\theta}{\sin\theta}$. (3 marks)

**--- End of Paper ---**



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