

St. Stephen's Girls' College  
Final Examination 2021-2022

Form 2  
145 students

LL, SCHL, TYL, CYN

MATHEMATICS  
Paper II  
Time Allowed: 1 hour

Name: \_\_\_\_\_ No.: \_\_\_\_\_ Class: \_\_\_\_\_ Division: \_\_\_\_\_

**Instructions:**

- Answer **ALL** questions in the spaces provided in this **Question-Answer Paper**.
- All rough work should be done on the rough work paper provided, but will not be marked.
- The diagrams in this paper are not necessarily drawn to scale.
- Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
- This paper carries 100 marks.

Marks:

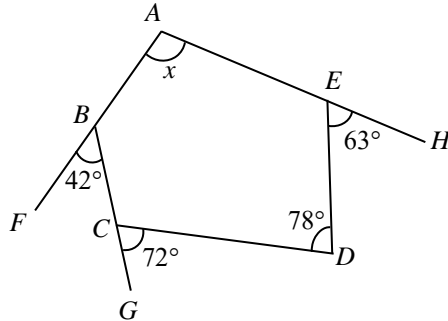
/ 100

1. Determine whether each of the following is an identity. Circle the correct answers.
  - (a)  $(2y + 3)^2 = 4y^2 + 6y + 9$
  - (b)  $(a - 5)^2 = a^2 - 25$
  
2. Factorize the following expressions.
  - (a)  $18x^2y + 12xy^3$
  - (b)  $9a(5b - 7a) + 7a - 5b$
  
3. If  $(P - x)(3 + x) \equiv -x^2 - Qx + 9$ , where  $P$  and  $Q$  are constants, find the values of  $P$  and  $Q$ .
  
4. A train travels at a speed of 42 km/h. How long does the train take to travel 294 km?
  
5. Simplify 250 mL : 2 L.
  
6. If  $a : b = 2 : 5$  and  $4a = 3c$ , find  $a : b : c$ .
  
7. The scale of a map is 1 : 4 000. If the distance between a restaurant and a cinema on the map is 5 cm, find the actual distance between the two places in km.
  
8. Change the subject of the following formula to the letter in the square brackets.
 
$$a = \frac{3b + 4c}{5} \quad [b]$$
  
9. Simplify  $\frac{3x}{4(x-5)} - \frac{x}{6(5-x)}$ .
  
10. Solve the simultaneous equations  $\begin{cases} 5x + 2y = 11 \\ 2x - 3y = 12 \end{cases}$ .
  
11. The total price of 4 rulers and 9 rubber erasers is \$55. If the price of a ruler is higher than that of a rubber eraser by \$4, find the price of a ruler.

<u>Answers</u>	<u>Marks</u>
1.	
(a) Yes / No	1
(b) Yes / No	1
2.	
(a) _____	2
(b) _____	2
3. $P =$ _____	1
$Q =$ _____	1
4. _____	2
5. _____	2
6. _____	2
7. _____	3
8. _____	2
9. _____	3
10. $x =$ _____	1
$y =$ _____	1
11. _____	3
<b>Subtotal:</b>	<b>/ 27</b>

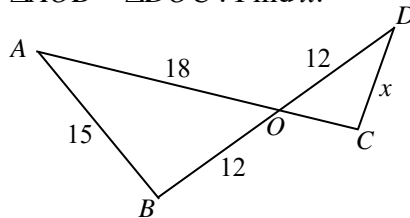
12. It is given that the graph of the equation  $4x - 5y = 8$  passes through  $A(a + 3, a)$  and the point  $B$  on the  $x$ -axis. Find the value of  $a$  and the coordinates of  $B$ .

13. In the figure,  $ABF$ ,  $BCG$  and  $AEH$  are straight lines. Find  $x$ .

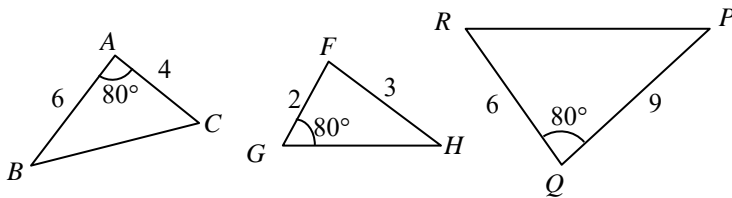


14. If 5 times an exterior angle of a regular polygon is less than its interior angle by  $60^\circ$ , find the number of sides of the regular polygon.

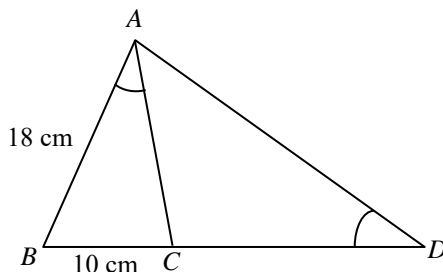
15. In the figure,  $\triangle AOB \sim \triangle DOC$ . Find  $x$ .



16. In the figure, name a pair of similar triangles and give reasons.



17. In the figure,  $BCD$  is a straight line and  $\angle BAC = \angle BDA$ .  $AB = 18$  cm and  $BC = 10$  cm. Find  $CD$ .



- 18. (a) Round off 195.7648 to 3 significant figures.
- (b) Round up 195.7648 to 2 decimal places.
- (c) Round down 195.7648 to the nearest integer.

12.  $a =$  \_\_\_\_\_ 2

$B = ( \text{ \_\_\_\_ } , \text{ \_\_\_\_ } )$  2

13.  $x =$  \_\_\_\_\_ 3

14. \_\_\_\_\_ 3

15.  $x =$  \_\_\_\_\_ 2

16. \_\_\_\_\_ 2

Reason: \_\_\_\_\_ 1

17. \_\_\_\_\_ 3

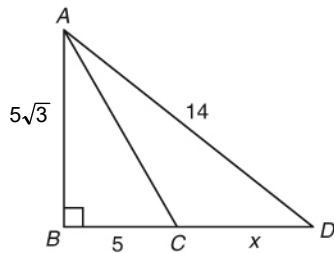
18. (a) \_\_\_\_\_ 1

(b) \_\_\_\_\_ 1

(c) \_\_\_\_\_ 1

**Subtotal:** / 21

19. How many significant figures are there in each of the following numbers?  
 (a) 0.10340  
 (b) 850 000 (correct to the nearest thousand)
20. If the time to cook a fish well is measured as 9 minutes with a percentage error of 4%, find the maximum absolute error in second.
21. The lifetime of a light bulb is measured as 1800 hours, correct to the nearest 3 hours. Find the relative error and give your answer in the form of  $\frac{1}{n}$ .
22. The length of a pen is measured as  $x$  cm by using a ruler with a scale interval of 1 mm. If the percentage error is 0.4%, find the value of  $x$ .
23. X and Y are two square plots of land. The length of each side of X is 4 km. The area of Y is 4 times that of X. Find the length of each side of Y.
24. In the figure,  $BCD$  is a straight line. Find the value of  $x$ .

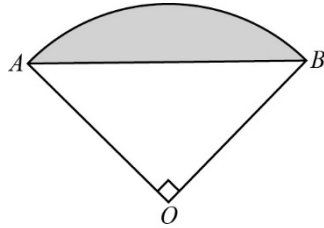


25. Which of the following is/are true? Circle the correct answers.  
 (a)  $\sqrt[3]{27} = 3$  or  $-3$   
 (b)  $\sqrt{\frac{1}{4^2}} = \frac{1}{4}$
26. Which of the following numbers is/are rational number(s)? Circle the correct answers.  
 (a)  $\pi$   
 (b)  $\sqrt{16}$   
 (c)  $0.\dot{5}$

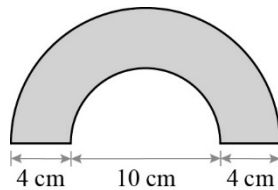
19.		
(a)	_____	1
(b)	_____	1
20.	_____	3
21.	_____	3
22.	_____	3
23.	_____	3
24.	_____	3
25.		
(a)	Yes / No	1
(b)	Yes / No	1
26.		
(a)	Yes / No	1
(b)	Yes / No	1
(c)	Yes / No	1

**Subtotal:**  / 22

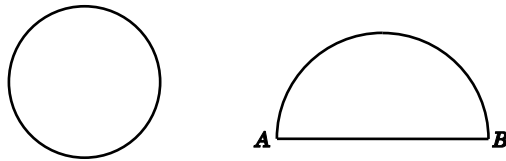
27. In the figure,  $AOB$  is a sector with centre  $O$ . If the area of the shaded region is  $50 \text{ cm}^2$ , find the length of  $OA$  correct to 3 significant figures.



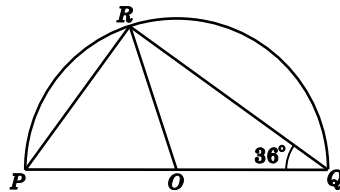
28. The following figure is formed by semi-circles and straight lines.



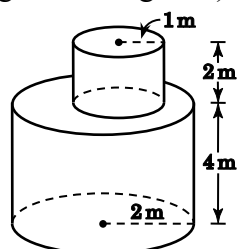
- (a) Find its perimeter correct to 3 significant figures.  
 (b) Find its area correct to 3 significant figures.
29. The figure shows a circle and a semi-circle. It is given that the circumference of the circle is equal to the length of  $\widehat{AB}$ . Which of the following is/are true? Circle the correct answers.



- (a) The radius of the semi-circle is twice the radius of the circle.  
 (b) The area of the semi-circle is twice the area of the circle.
30. In the figure,  $PRQ$  is a semi-circle with centre  $O$  and  $\angle PQR = 36^\circ$ . If the radius of the semi-circle is 1 cm, find  $\widehat{PR} : \widehat{RQ}$ .



31. In the figure, the solid is formed by two right circular cylinders. Find the total surface area of the solid. (Give your answer correct to 3 significant figures.)



27. \_\_\_\_\_ 3

28. \_\_\_\_\_

(a) \_\_\_\_\_ 2

(b) \_\_\_\_\_ 2

29. \_\_\_\_\_

(a) Yes / No 1

(b) Yes / No 1

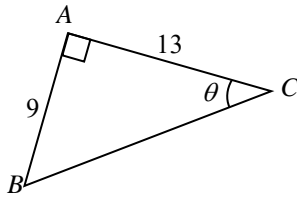
30. \_\_\_\_\_ 3

31. \_\_\_\_\_ 3

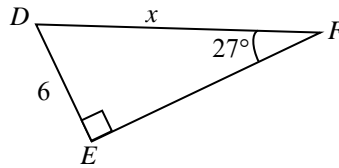
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32. In each of the following figures, find the unknown. (Give your answers correct to 3 significant figures if necessary.)

(a)



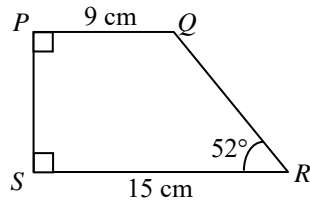
(b)



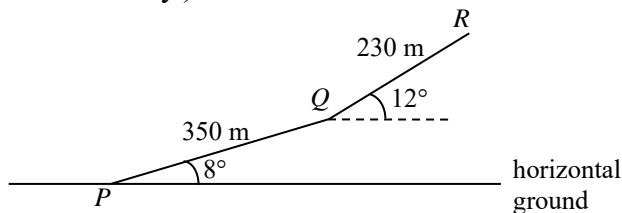
33. Find the acute angle  $\theta$  in the following correct to the nearest degree.

$$\tan \theta = \frac{\tan 30^\circ}{2} + 1$$

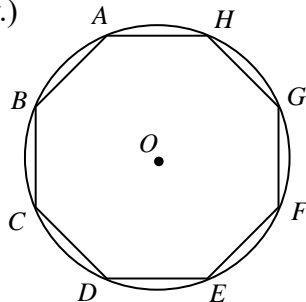
34. In the figure,  $PQRS$  is a trapezium. Find the area of  $PQRS$ . (Give your answer correct to 3 significant figures if necessary.)



35. In the figure,  $PQ$  and  $QR$  are two inclined roads.  $PQ = 350$  m and  $QR = 230$  m. It is known that the angles made by  $PQ$  and  $QR$  with the horizontal are  $8^\circ$  and  $12^\circ$  respectively. Find the vertical distance from  $R$  to the horizontal ground. (Give your answer correct to 3 significant figures if necessary.)



36. In the figure,  $O$  is the centre of a circle of radius 10 cm.  $A, B, C, D, E, F, G$  and  $H$  are points on the circle such that  $ABCDEFGH$  is a regular octagon. Find the perimeter of  $ABCDEFGH$ . (Give your answer correct to 3 significant figures if necessary.)



32.

(a)  $\theta =$  \_\_\_\_\_ 2

(b)  $x =$  \_\_\_\_\_ 2

33. \_\_\_\_\_ 2

34. \_\_\_\_\_ 3

35. \_\_\_\_\_ 3

36. \_\_\_\_\_ 3

Subtotal: / 15

---End of Paper ---