2024 - 2025 Second Term Examination
Revision
S.3 Mathematics

S.3_____

Name:_____(   )

Section A   **(44 marks)**

1. Factorize
    (a) $9c^2 - 6c + 1$,
    (b) $(4c + d)^2 - 9c^2 + 6c - 1$.

    (3 marks)

2. Simplify $\dfrac{x^{-8}y}{(x^7y^9)^{-6}}$ and express your answer with positive indices.

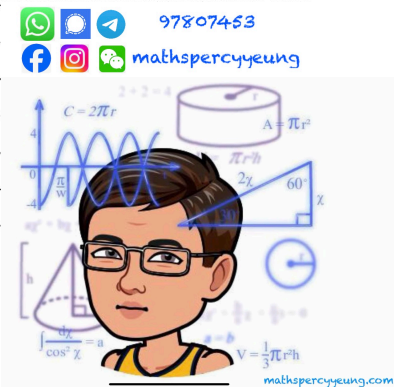   (3 marks)

3. The marked price of a shirt is higher than its cost by $80 . The shirt is sold at a discount of 10% on its marked price. After selling the shirt, the percentage profit is 30% . Find the marked price of the shirt.

    (4 marks)

4. The original length of a wire is 80 cm. 30% of it is cut off, and then x% of the remaining wire is further cut off. If the length of the wire left at last is 47.6 cm, find the value of x.
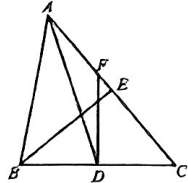
    (3 marks)

Name:_____   S. 3_____ (   )

5. Solve the inequality $\frac{5}{8}x - 11 \leq -16$ and represent the solutions graphically.

(3 marks)

6. In $\triangle ABC$, $DF \perp BC$, $\angle ABE = \angle CBE$ and $BD = DC$.

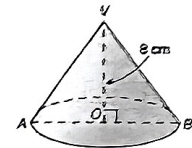Identify each of the following special lines of $\triangle ABC$.
(a) Perpendicular bisector
(b) Angle bisector
(c) Median

(3 marks)

7. The base of a right pyramid is a rectangle of length 8 cm and width 7 cm. If the height of the pyramid is 15 cm, find its volume.

(2 marks)

8. The figure shows a right circular cone VAB.
If the circumference of the base of the cone is 12π cm, find
(a) the volume of the cone,
(b) the total surface area of the cone.
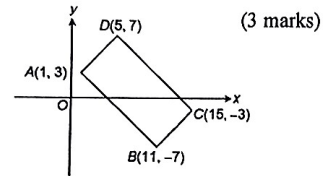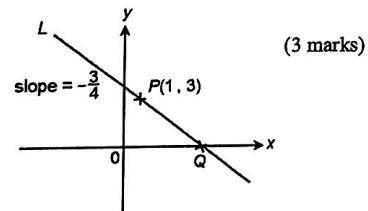(Give your answers in terms of π.)

(4 marks)

Name:_____ S. 3_____ (   )

9. Find the area of rectangle $ABCD$ in the figure.

(3 marks)

$D(5, 7)$
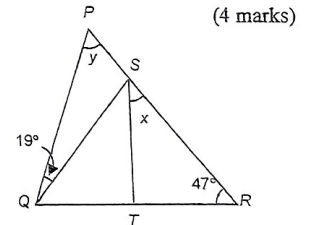$A(1, 3)$
$C(15, -3)$
$B(11, -7)$

10. In the figure, Q is a point on the x-axis. The slope of the straight line L passing through $P(1, 3)$ and Q is $-\dfrac{3}{4}$. Find the coordinates of Q.

(3 marks)

slope $= -\dfrac{3}{4}$ $P(1, 3)$

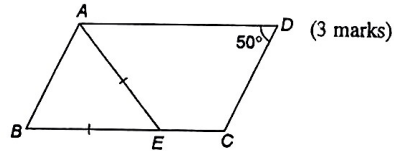11. Determine whether $D(-4, 3)$, $E(-2, 2)$ and $F(7, -2)$ are collinear.

(2 marks)

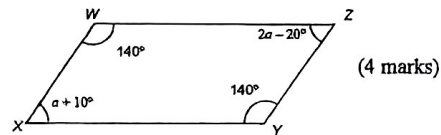12. In the figure, S and T are points on PR and QR respectively such that ST is the perpendicular bisector of QR. Find x and y.

(4 marks)

P
y
S
x
$19°$
$47°$
Q
T
R

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13. In the figure, *ABCD* is a parallelogram. *E* is a point on *BC* such that *AE = BE*. If $\angle ADC = 50°$, find $\angle AEC$.

(3 marks)

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14. In the figure, *WXYZ* is a quadrilateral.
    (a) Find *a*.
    (b) Prove that *WXYZ* is a parallelogram.

(4 marks)

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Section B   **(26 marks)**

15. There are 20 multiple choice questions in a test. 5 marks will be awarded to each correct answer while 1 mark will be deducted from each wrong or blank answer. It is given that the passing mark of the test is 50.
    (a) At least how many questions have to be answered correctly to pass the test?
    (b) Ben has answered all questions in the test. By using the result of (a), if Ben answers 7 questions wrongly, can he pass the test? Explain your answer.
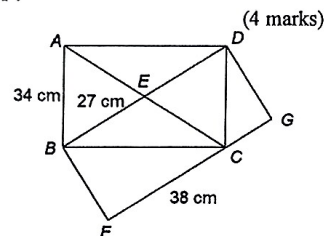
(4 marks)

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16. Angela deposited $18 000 in a bank at an interest rate of *r*% p.a. compounded half-yearly. After 1 year, she received an amount of $19 845. Find the value of *r*.
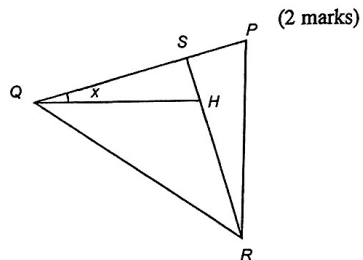
(3 marks)

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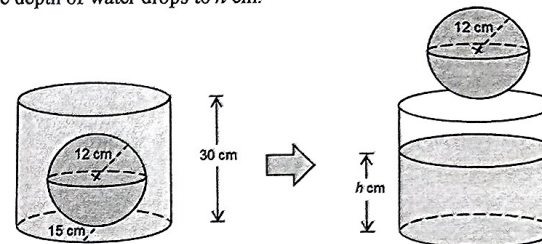Name:_____ S. 3_____ (   )

17. In the figure, *ABCD* is a parallelogram and *BFGD* is a rectangle. *AEC*, *BED* and *FCG* are straight lines. If *AB* = 34 cm, *BE* = 27 cm and *CF* = 38 cm, find the length of *BF*.

(4 marks)

18. In the figure, *H* is the orthocentre of $\triangle PQR$. *RH* is produced to meet *PQ* at *S*. Given that $\angle QHR = 113°$, find *x*.

(2 marks)

19. A solid sphere of radius 12 cm is put into a right circular cylindrical vessel of base radius 15 cm and height 30 cm. Water is then poured into the vessel until it is completely filled up. Then the sphere is taken away and the depth of water drops to *h* cm.

(a) Find the volume of the sphere in terms of π.
(b) Find the value of *h*.

(4 marks)

Name:_____ S. 3_____ (   )

20. Two identical metal solid right pyramids with a square base of side T cm are melted and recast into 75 identical smaller solid right pyramids with height 8 cm and a square base of side t cm. It is given that the base area of the larger pyramid is 16 times that of the smaller pyramid.
    (a) Find $T : t$.
    (b) Find the height of the larger pyramid.
    (c) Peter claimed that the smaller pyramid and the larger pyramid are similar solids. Do you agree? Explain your answer.

    (5 marks)

21. In the figure, S and T are points on PQ and QR respectively such that RS is the angle bisector of $\angle PRQ$ and $ST \perp QR$. $\angle QPR = 90°$ and $PR = QT$.
    (a) Prove that $\triangle PRS \cong \triangle TQS$.
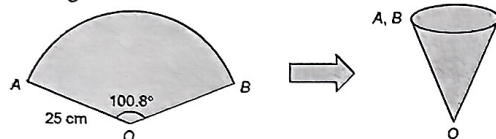   (b) Is ST the perpendicular bisector of QR? Explain your answer.
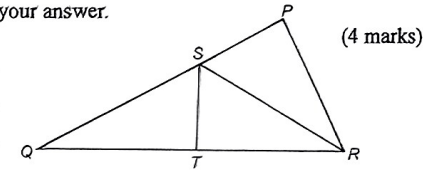
    (4 marks)

Name:_____   S. 3_____ (   )

Section C   Bonus Questions   (10 marks)

22. In the figure, a paper sector is folded into a cup in the shape of a right circular cone. The radius of the sector is 25 cm and the angle of the sector is $100.8°$.
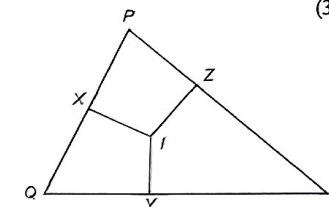

(a) Find the base radius of the cup.
(b) Are 150 cups enough to hold 0.18 m^3 of water? Explain your answer.

(4 marks)

23. In the figure, I is the incentre of $\triangle PQR$. X, Y and Z are points on PQ, QR and PR respectively such that $IX \perp PQ$, $IY \perp QR$ and $IZ \perp PR$. $PQ = 17$ cm, $QR = 25$ cm and $PR = 26$ cm. Given that the area of $\triangle PQR$ is 204 cm^2, find the length of IZ.
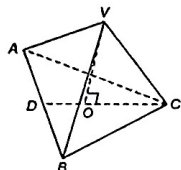
(3 marks)

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24. The figure shows a regular tetrahedron *VABC*. The length of each edge is 10 cm. *CD* is a median of $\triangle ABC$. It is given that $DO : OC = 1 : 2$.

Find

(a) the length of *CD*,

(b) the volume of the regular tetrahedron.

(3 marks)

~ End of Paper ~

15

Revision

S.3 Mathematics Paper 2

S.3_____

Name:_____(   )

1. Factorize $m^2 + mn - 6n^2 + m - 2n$.

   A. $(m-2n)(m+3n+1)$
   B. $(m+2n)(m+3n+1)$
   C. $(m-2n)(m-3n+1)$
   D. $(m+2n)(m-3n+1)$

2. $4^{600} \cdot 27^{200} =$

   A. 12^{600}.
   B. 12^{800}
   C. 108^{600}
   D. 108^{800}

3. If x is a positive integer satisfying the inequality $x - 7 \le 1 - x$, then the least value of x is

   A. 1.
   B. 2.
   C. 3.
   D. 4.

4. The value of a vase depreciates by 8% every year. If the value of the vase is $1500 now, find the value of the vase two years ago. (corr. to the nearest integer)
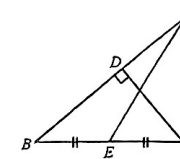
   A. $1270
   B. $1286
   C. $1750
   D. $1772

5. In the figure, $ABCD$ is a parallelogram. It is given that $AE = 3x - 1, DE = 2y + 4, BE = 4x + 2$ and $CE = 11 - x$. AC and BD intersect at E. Find y.
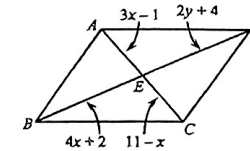
   A. 5
   B. 4
   C. 3
   D. 2

6. Refer to the figure.

   Which of the following lines must be an altitude of $\triangle ABC$?

   I. AC
   II. CD
   III. AE

   A. I only
   B. II only
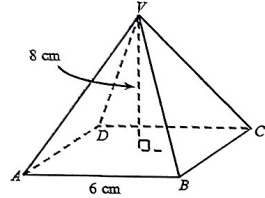   C. I and II only
   D. II and III only

7. The diameter of a sphere is 36 cm. Find the volume of the sphere in terms of π.

   A. $1296\pi\, cm^3$
   B. $7776\pi\, cm^3$
   C. $24429\pi\, cm^3$
   D. $62208\pi\, cm^3$

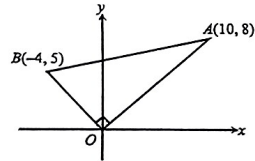Name:_____   S.3_____ (   )

8. The figure shows a pyramid $VABCD$ of height 8 cm. Its base is a rectangle, where $AB = 6$ cm. If the volume of the pyramid is 80 cm^3, find the length of BC.

A. 4 cm
B. 5 cm
C. 6 cm
D. 7 cm

9. In the figure, O is the origin. $\angle AOB = 90°$. Find the area of $\triangle OAB$.

A. 9
B. 18
C. 41
D. 82

10. Miss Chan borrows a sum of money from a bank at an interest rate of 8.4% p.a., compounded monthly. After 2 years, she will have to pay interest of $20 204. Find the amount of money that Miss Chan borrows. (corr. to the nearest dollar)

A. $139 434
B. $115 414
C. $111 949
D $110 862

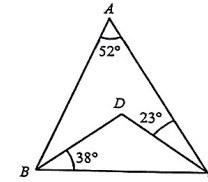11. $2^{11} + 2^{10} + 7(2^9) + 2^5 - 2^4 =$

A. 110100001000_2.
B. 110100011000_2.
C. 1101000010000_2.
D. 1101000011000_2.

12. In the figure, $ABCD$ and FED are straight lines. It is given that $AB = 12$. Find AC.
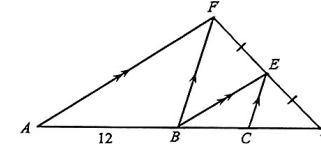
A. 14
B. 16
C. 18
D. 20

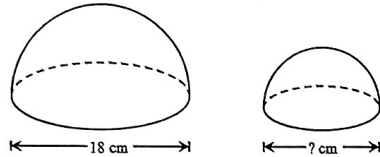13. In the figure, D is the circumcentre of $\triangle ABC$. Find $\angle ABD$.

A. 23°
B. 29°
C. 38°
D. 52°

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14.   In the figure, the curved surface areas of two hemispheres are $9A$ cm^2 and A cm^2 respectively.

|←————— 18 cm —————→| |←——— ? cm ———→|

If the diameter of the larger hemisphere is 18 cm, then the diameter of the smaller hemisphere is

A.   4 cm.

B.   6 cm.

C.   8 cm.

D.   10 cm.

15.   If $a > 0 > b$ and $k < 0$, which of the following statement must be true?

A. $a + k > b + k$

B. $a + b > 0$

C. $ak > bk$

D. $\dfrac{a}{k} > \dfrac{b}{k}$

16.   The figure shows a right frustum $ABCD$. The radii of the upper base and the lower base are 3 cm and 9 cm respectively. It is given that $NM = 14$ cm. Find the volume of the frustum.
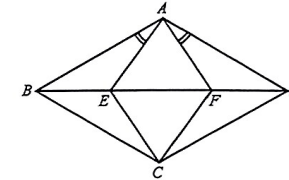

A. 1701π cm^3

B. 1638π cm^3

C. 567π cm^3
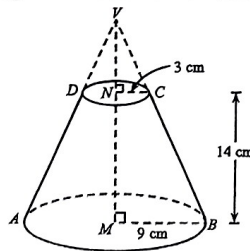
D. 546π cm^3

17.   The straight line L passes through $P(6, -7)$ and $Q(-9, -17)$ and cuts the y-axis at R. The coordinates of R are

A. $(0, -9)$.

B. $(0, -10)$.

C. $(0, -11)$.

D. $(0, -12)$.

18.   In the figure, $BEFD$ is a straight line. $ABCD$ is a rhombus. $\angle BAE = \angle DAF$.
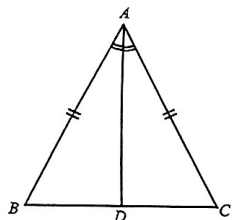

Which of the following must be true?

I. $AECF$ is a rhombus

II. $\triangle ABE \cong \triangle CDF$

III. $\triangle ABF \cong \triangle ADE$

A.   I and II only

B.   I and III only

C.   II and III only

D.   I, II and III

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19. In the figure, $\triangle ABC$ is an acute-angled triangle with $AB = AC$. D is a point on BC such that $\angle BAD = \angle CAD$.

Which of the following must be true?

I.   The centroid of $\triangle ABC$ lies on AD.

II.   The in-centre of $\triangle ABC$ lies on AD.

III. The orthocentre of $\triangle ABC$ lies on AD.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

20. In the figure, $ABCD$ is a trapezium with $AB \ // \ DC$ and $AB : DC = 4 : 3$. F is the mid-point of AB. AC and DF intersect at E. If the area of $\triangle ADE$ is 24 cm^2, then the area of $ABCD$ is
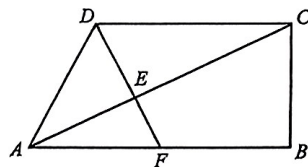
A. $\dfrac{340}{3}$ cm^2.

B. 120 cm^2.

C. 140 cm^2.

D. 160 cm^2.

~ End of paper ~