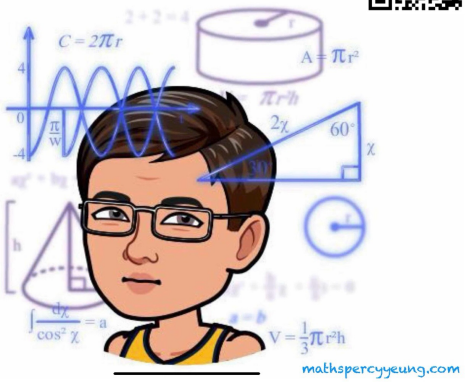
mathspercyyeung




**2022-23**
**F.3 MATHS**
**Final Exam**
**PAPER 1**

2022-2023 Final Examination

**F.3 MATHEMATICS Paper 1**

**Question-Answer Book**

8 : 30 a.m. - 10 : 00 a.m. ( 90 mins. )

Date : 23rd June, 2023.

This paper must be answered in English .

| | |
|---|---|
| **Mark** | /100 |
| **Parent's Signature** | |

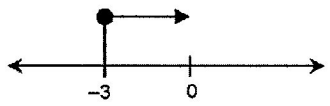
| | |
|---|---|
| **Name** | |
| **Class** | |
| **Class Number** | |

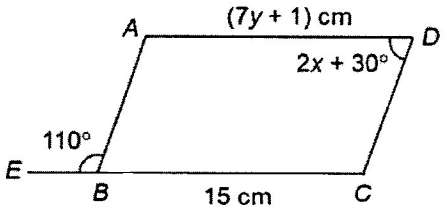
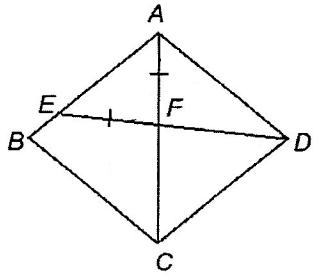
| Question No. | Marker ' s Use Only | |
|---|---|---|
| **Section A** | | **35** |
| **1-8** | | **11** |
| **9-13** | | **6** |
| **14-18** | | **9** |
| **19-25** | | **9** |
| **Section B** | | **65** |
| **1-2** | | **11** |
| **3-4** | | **10** |
| **5-6** | | **10** |
| **7** | | **7** |
| **8** | | **7** |
| **9** | | **6** |
| **10** | | **7** |
| **11** | | **7** |
| **Total** | | **100** |

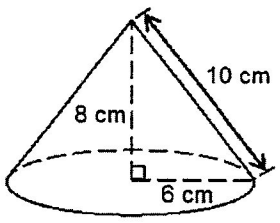
Read carefully the following instructions :

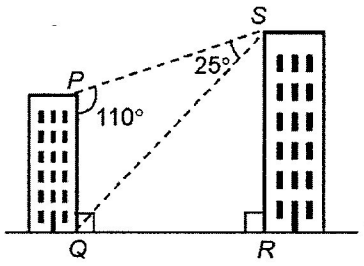
1. This paper must be answered in English.
2. When told to open this question answer book, you should check that all the questions are there. The words 'END OF PAPER' should appear after the last question.
3. Read the questions carefully. Attempt **ALL** questions. This paper consists of 25 questions in section A and 11 questions in section B.
4. Write all your answers in the spaces provided in this Question-Answer Book.
5. In section B, show all steps and geometrical reasons clearly.
6. Unless otherwise specified, numerical answers should be either *exact* or *correct to 3 significant figures*.
7. The diagrams in this paper are not necessarily drawn to scale.

**Section A: Write your answers in the spaces provided. Working need not be shown. (35 marks)**

| | | |
|---|---|---|
| **1.** | **(a)** Factorize $4xy-12xz$. | **1.(a)** _____ |
| | **(b)** Factorize $4k^2-9$. | **1.(b)** _____ |
| | **(c)** Factorize $x^2-4x-5$. | **1.(c)** _____ |
| | **(d)** Factorize $2x^2-45y+10x-9xy$. | **1.(d)** _____ |
| **2.** | The area of a desert is about 230 000 $km^2$. Use scientific notation to represent this area in $km^2$. | **2.** _____ |
| **3.** | Simplify $\frac{1}{y^2}(4y)^5$ and express the answer with positive index. | **3.** _____ |
| **4.** | Convert $22_{10}$ into binary numbers. | **4.** _____ |
| **5.** | According to the diagram, write down an inequality in $x$.   | **5.** _____ |
| **6.** | Solve the inequality $7 \geq 3x-5$. | **6.** _____ |
| **7.** | Use an inequality to represent the statement of 'Subtracting ***a*** from 3 is not less than 10'. | **7.** _____ |
| **8.** | The value of a car was \$80 000 in 2019. Its value depreciated by 25% each year. Find the value of the car in 2022. | **8.** _____ |

| | | |
|---|---|---|
| **9.** | Elsa deposits \$5000 in a bank. The simple interest rate is 3% p.a. How long will it take Elsa to receive an interest of \$750? | **9.** _____ |
| **10.** | Cheryl deposits \$15 000 in a bank at an interest rate of 4% p.a. compounded yearly. Find the amount she will receive after 3 years. | **10.** _____ |
| **11.** | In the figure, $ABCD$ is a parallelogram and $CB$ is produced to $E$. $\angle ABE = 110°$, $\angle ADC = 2x + 30°$, $BC = 15$ cm and $AD = (7y + 1)$ cm.<br>  <br><br>**(a)** Find the value of $x$.<br>**(b)** Find the value of $y$. | **11.(a)** _____<br>**11.(b)** _____ |
| **12.** | In the figure, $ABCD$ is a rhombus. $AEB$, $AFC$ and $DFE$ are straight lines. It is given that $AF = EF$ and $\angle BAD = 112°$. Find $\angle CDE$.<br>  <br> | **12.** _____ |
| **13.** | The volume of a hemisphere is $486\pi$ cm$^3$. Find the radius of the hemisphere. | **13.** _____ |

| | | |
|---|---|---|
| **14.** | The figure shows a right circular cone of height 8 cm and base radius 6 cm. Its slant height is 10 cm.<br>  <br><br>**(a)** Find the total surface area of the cone in terms of $\pi$.<br>**(b)** Find volume of the cone in terms of $\pi$. | **14.(a)** _____<br>**14.(b)** _____ |
| **15.** | $A(5, -9)$ and $B(-3, 7)$ are two points on a straight line $L$ in a rectangular coordinate plane.<br>**(a)** Find the coordinates of the mid-point of the line segment $AB$.<br>**(b)** Find the distance between $A$ and $B$. (Give your answer correct to the nearest integer.)<br>**(c)** Find the slope of $L$.<br>**(d)** Given that $P(2, y)$ is a point on $AB$. Find the value of $y$. | **15.(a)** _____<br>**15.(b)** _____<br>**15.(c)** _____<br>**15.(d)** _____ |
| **16.** | Find the value of $\dfrac{\tan 60°}{\sin 30° + 1}$ without using a calculator. (Leave your answer in surd form.) | **16.** _____ |
| **17.** | It is given that $\cos\theta = \dfrac{5}{8}$, where $\theta$ is an acute angle. Find the value of $\tan\theta$.<br>(Leave your answer in surd form.) | **17.** _____ |
| **18.** | Simplify $\dfrac{\sin(90° - \theta)\tan\theta}{\cos(90° - \theta)}$. | **18.** _____ |

| | | |
|---|---|---|
| **19.** | Find the inclination of a straight road with gradient 2.49. (Give your answers correct to 3 significant figures.) | **19.** _____ |
| **20.** | The figure shows two buildings. Find the angle of elevation of S from Q.<br>  <br> | **20.** _____ |
| **21.** | If the true bearing of $B$ from $A$ is 230°, find the true bearing of $A$ from $B$. | **21.** _____ |
| **22.** | From the set of data presented by the following stem-and-leaf diagram, find<br>Stem (1) \| Leaf (0.1)<br>6 \| 0 1 8<br>7 \| 7 9<br>8 \| 2 3 4 4 5 7<br>9 \| 1 6<br>**(a)** the mean,<br>**(b)** the median,<br>**(c)** the mode. | **22.(a)** _____<br>**22.(b)** _____<br>**22.(c)** _____ |
| **23.** | A bag contains 5 green balls, 3 red balls and 7 blue balls. If a ball is drawn at random from the bag, find the probability that the ball drawn is green. | **23.** _____ |
| **24.** | Two balls are drawn at random a bag containing from 1 white ball and 2 black balls at the same time. Find the probability that the two balls drawn are of different colours. | **24.** _____ |
| **25.** | A bag contains five \$2 coins, two \$5 coins and three \$10 coins. A coin is drawn at random from the bag. Find the expected value of the coin drawn. | **25.** _____ |

**Section B:** **All working must be clearly shown. Write the mathematical expressions, answers and statements/conclusions in the spaces provided.** **(65 marks)**

**1.** Factorize

**(a)** $-ab+2bc$,

**(b)** $3a^2-7ac+2c^2$,

**(c)** $3a^2-7ac+2c^2-ab+2bc$.

(6 marks)

**2.** Solve the inequality $\frac{4(2x+3)}{5} > \frac{3(5+2x)}{4}$ and represent the solutions graphically. (5 marks)

**3. (a)** Simplify $\frac{x^{-8}y^{12}}{(y^{-2})^{-5}}$ and express your answer with positive indices.

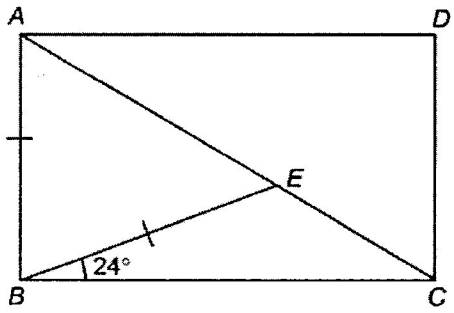
**(b)** Simplify $\frac{7^{-4n}}{49^{-5n}}$, where n is a positive integer. Express your answer with a positive index.

(5 marks)

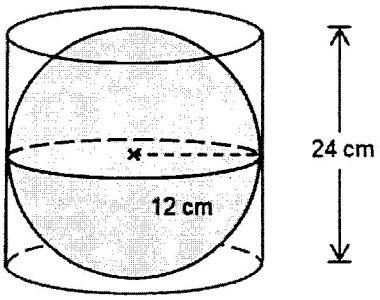
**4.** \$50 000 is invested in a bank for 3 years at 8% p.a. Find the difference between the simple interest and the interest which is compounded quarterly. (Give your answer correct to the nearest integer.)

(5 marks)

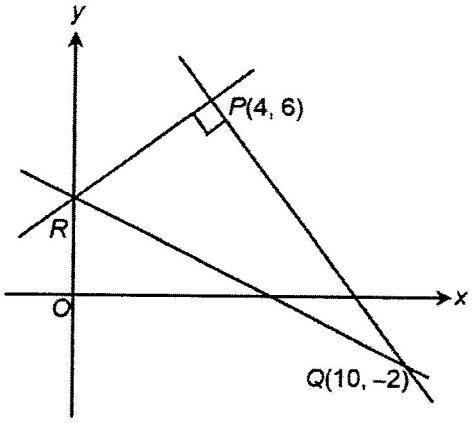
**5.** In the figure, $ABCD$ is a rectangle. $E$ is a point on $AC$ such that $BE = BA$ and $\angle CBE = 24°$. Find $\angle DAC$. (5 marks)




**6.** In the figure, a sphere of radius 12 cm can just fit into a right circular cylindrical container of height 24 cm. Find the volume of the empty space in the container in terms of $\pi$. (5 marks)



7. In the figure, the straight line passing through $P(4, 6)$ and $Q(10, -2)$ is perpendicular to the straight line passing through $P$ and $R$. $R$ is a point lying on the $y$-axis.




**(a)** Find the coordinates of $R$.

**(b)** Find the area of $\Delta PQR$.

(7 marks)

**8. (a)** Simplify $\dfrac{3}{\tan^2\theta}+3$.

**(b)** Simplify $\dfrac{\sin\theta+\cos\theta}{1-\tan^2\theta}+\dfrac{\sin^2\theta}{\sin\theta-\cos\theta}$.

(7 marks)

**9.** Box A contains 2 red cards and 1 yellow card. Box B contains 2 green cards and 2 yellow cards. A card is drawn at random from each box.

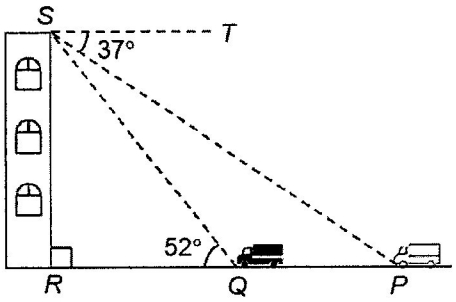
**(a)** List all the possible outcomes in a table.

**(b)** Find the probability that the colours of the two cards drawn are different.

**(c)** Find the probability that at least one of the cards drawn is yellow.

(6 marks)

**10.** In the figure, the angle of depression of truck A on the ground at position P from the top of a building is 37°. Truck A is moving towards the building at a speed of 12 m/s and it takes 5 seconds to move from P to Q. It is known that the angle of elevation of the top of the tower from Q is 52°.




**(a)** Find the height of the building. (Give your answer correct to 3 significant figures.)

**(b)** When truck A just passes Q, another truck B starts moving from the building towards truck A at a speed of 16 m/s. Will trucks A and B meet each other within 3 seconds? Explain your answer.

(7 marks)

**11.** The following table shows the results of Kenny in 3 quizzes.

| | **Quiz 1** | **Quiz 2** | **Quiz 3** |
|---|---|---|---|
| **Marks** | 63 | 68 | 79 |
| **Weight** | $x$ | 2 | $y$ |

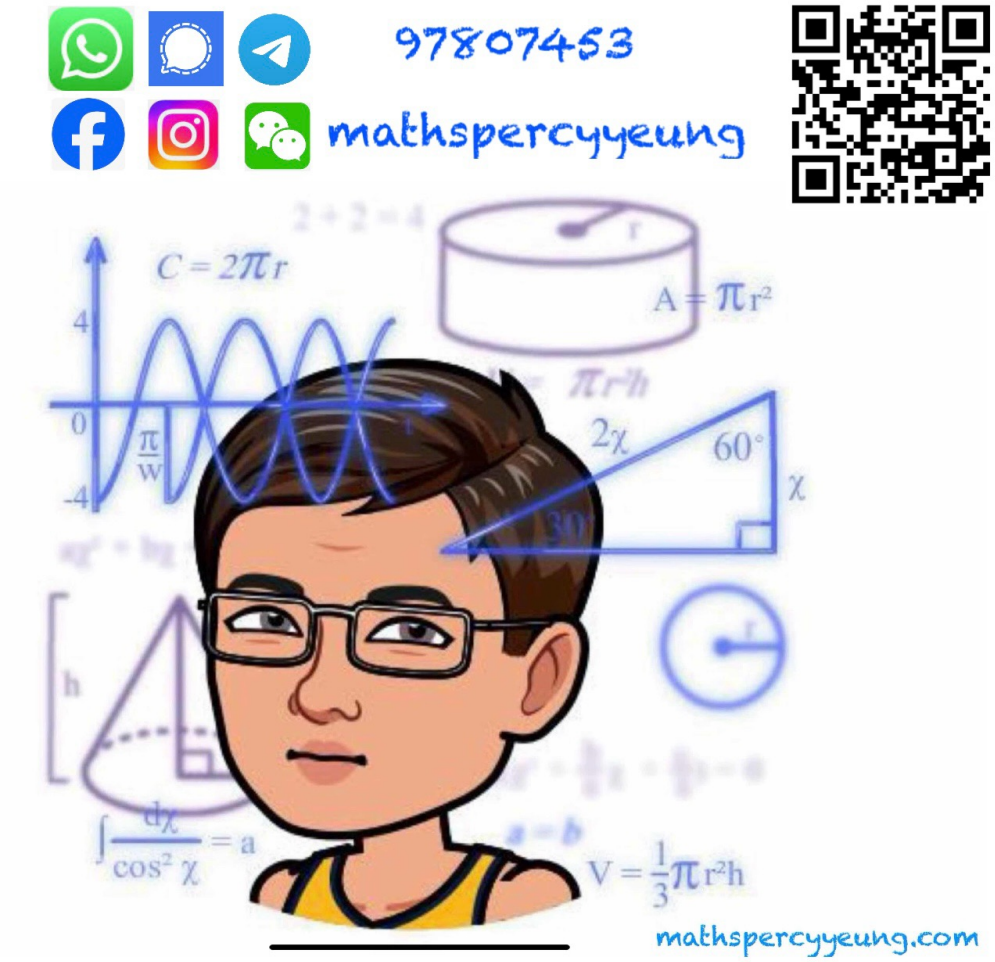
It is given that the weighted mean mark of Kenny is 72.

**(a)** Express $y$ in terms of $x$.

**(b)** If the weight for Quiz 1 is decreased by 1, then the weighted mean mark of Kenny will be increased by 1. Find the values of $x$ and $y$.

(7 marks)

**END OF PAPER**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$C = 2\pi r$
$A = \pi r^2$
$V = \frac{1}{3}\pi r^2 h$
$\int \frac{dx}{\cos^2 x} = a$
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