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Form 3

Final Examination 2013-2014

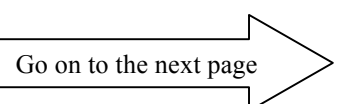
Mathematics

Paper II

INSTRUCTIONS

1. Write your examination number in the spaces provided on this cover page.
2. Write down all required information on the Multiple Choice Answer Sheet.
3. Answer all questions. Answer should be marked on the **Multiple Choice Answer Sheet**.
4. Each question carries 2 marks. The total mark is 90.
5. You should mark only ONE answer for each multiple choice question. If you mark more than one answer, you will receive No marks for that question.
6. No marks will be deducted for wrong answer.
7. The diagrams in this paper are not necessarily drawn to scale.

1. $(2x)^3(x+x+x) =$
- A. $6x^9$. B. $8x^9$. C. $18x^4$. D. $24x^4$.
2. If $ax + by + 1 = 0$ and $cx + dy + 1 = 0$, then $x =$
- A. $\frac{d-b}{ad-bc}$. B. $\frac{c-a}{ad-bc}$. C. $\frac{b+d}{ad-bc}$. D. $\frac{b-d}{ad-bc}$.
3. $(a+b)^2 - 4(a^2 - b^2) + 4(a-b)^2 =$
- A. $(3b-a)^2$. B. $(a+2b)^2$. C. $a^2 + b^2$. D. $(3a-b)(b-3a)$.
4. $0.030\ 449 =$
- A. 0.03 (correct to 2 significant figures)
 B. 0.030 (correct to 2 decimal places)
 C. $0.030\ 5$ (correct to 4 decimal places)
 D. $0.030\ 45$ (correct to 4 significant figures)
5. The solution of $2x + 3 > 7$ or $3 - \frac{x+3}{4} < x + 1$ is
- A. $x < 1$. B. $x < 2$. C. $x > 1$. D. $x > 2$.
6. The solution of $-7 < 1 - 2x < x + 4$ is
- A. $x < -1$. B. $-1 < x < 4$. C. $-4 < x < 1$. D. $x < -1$ or $x > 4$.
7. The total selling price of a cup of coffee and a glass of coke is \$42. The total selling price of 4 cups of coffee and 7 glasses of coke is \$213. The selling price of a glass of coke is
- A. \$15. B. \$17. C. \$25. D. \$27.
8. Thomas buys a book for \$150. He sells the book to Alice at a profit of 20%. If Alice sells the book to Samuel at a loss of 20%, Samuel buys the book at a price of
- A. \$96. B. \$144. C. \$150. D. \$216.



9. Alloys P and Q contain metals A and B only. In alloy P , weight of A : weight of $B = 3 : 5$. In alloy Q , weight of A : weight of $B = 9 : 4$. If alloys P and Q are melted and mixed together, how many kg of alloy Q is required to mix with 48 kg of alloy P such that a mixture with weight of A : weight of B equal to 3 : 2 can be made?

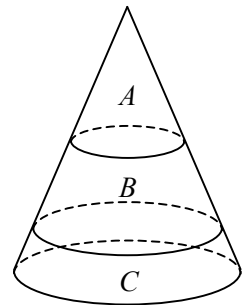
- A. 72 kg B. 117 kg C. 234 kg D. 334 kg

10. If Miss Ho pays the quarterly rates of \$2 400 for her property, find the rateable value of her property. (Let the rate percentage be 5%.)

- A. \$480 B. \$48 000 C. \$192 000 D. \$240 000

11. In the figure, a right circular cone is cut into three parts A , B and C along two planes parallel to its base. If height of A : height of B : height of $C = 3 : 2 : 1$, then volume of A : volume of B : volume of $C =$

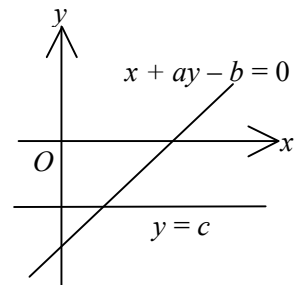
- A. 27 : 91 : 98. B. 27 : 98 : 91.
C. 27 : 125 : 216. D. 27 : 216 : 125.



12. Refer to the graphs on right, which of the followings must be true?

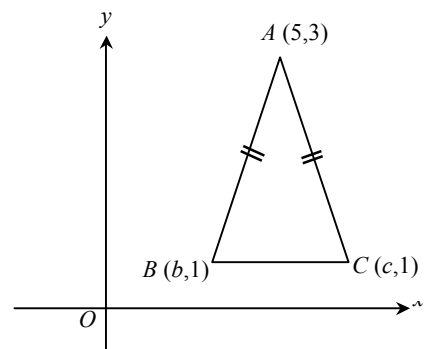
- I. $a > 0$
II. $b > 0$
III. $ac < b$

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



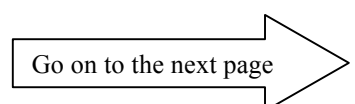
13. In the figure, $A(5,3)$, $B(b,1)$ and $C(c,1)$ are the vertices of a triangle. If $AB = AC$, then $b + c =$

- A. 3.
B. 5.
C. 6.
D. 10.



14. $A(7, 14)$ and $B(1, 2)$ are two points. C is a point on AB produced such that $AB : BC = 2 : 1$. Find the coordinates of C .

- A. $(-5, -10)$ B. $(-2, -4)$ C. $(3, 6)$ D. $(5, 10)$



21.
$$\frac{2\sin\theta \cos\theta - \sin(90^\circ - \theta)}{1 - \sin\theta + \cos^2(90^\circ - \theta) - \cos^2\theta} =$$

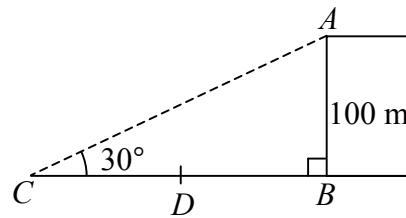
- A. 1. B. $\cos\theta$. C. $\tan\theta$. D. $\frac{1}{\tan\theta}$.

22. In $\triangle ABC$, $\angle A : \angle B : \angle C = 1 : 2 : 3$, then $\sin A : \sin B =$

- A. 1 : 2. B. $1 : \sqrt{3}$ C. $\sqrt{3} : 2$. D. $1 : \frac{\sqrt{3}}{2}$.

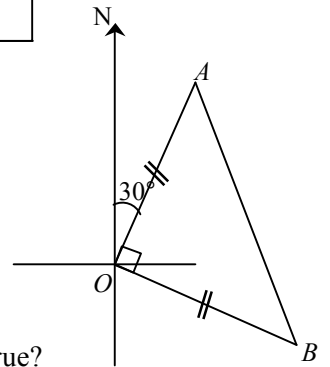
23. In the figure, AB is a building on a horizontal ground. The angle of elevation of A from a point C on the horizontal ground is 30° . D is the mid-point of BC . If $AB = 100$ m, find the angle of elevation of A from D , correct to 1 decimal place.

- A. 16.1° B. 40.9°
 C. 49.1° D. 73.9°



24. In the figure, the bearing of B from A is

- A. 015° B. 045°
 C. 075° D. 165°



25. If an interior angle of a regular n -sided polygon is 135° , which of the following are true?

- I. The value of n is 8.
- II. An exterior angle of the polygon is 45° .
- III. The number of axes of reflectional symmetry of the polygon is 4.

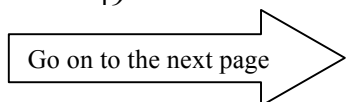
- A. I and II only B. I and III only C. II and III only D. I, II and III

26. The length and the width of a rectangle are measured as 7.2 cm and 5 cm respectively, correct to the nearest 0.1 cm. Which of the following could not be the actual area of the rectangle?

- A. 35.4 cm^2 B. 36.2 cm^2 C. 36.6 cm^2 D. 36.8 cm^2

27. A box contains 3 red balls and 4 black balls. Two balls are randomly drawn from the box at the same time. Find the probability that the balls drawn are both black.

- A. $\frac{1}{7}$ B. $\frac{2}{7}$ C. $\frac{6}{49}$ D. $\frac{12}{49}$



28. Refer to the following table:

Progressive rates in the year 2013/2014

<u>Net Chargeable income</u>	<u>Tax rate</u>
On the first \$40 000	2%
On the next \$40 000	7%
On the next \$40 000	12%
Remainder	17%

The net chargeable income of William in 2013/14 was \$168 000. Find the salaries tax paid by him.

- A. \$8 160 B. \$8 400 C. \$16 560 D. \$28 560

29. A die is thrown twice. Find the probability that the number obtained at the first throw is greater than that at the second throw.

- A. $\frac{1}{6}$ B. $\frac{5}{12}$ C. $\frac{1}{2}$ D. $\frac{7}{12}$

30. There are 1 red ball and 4 white balls in a box. A ball is drawn from the box at random. A man will get a prize if he draws a red ball. If he draws a white ball, he can have another chance to draw again after putting the white ball back into the box. He will then get a prize if he can draw a red ball in the second time. Otherwise, the game will be over. Find the probability of getting a prize.

- A. $\frac{1}{5}$ B. $\frac{2}{5}$ C. $\frac{9}{25}$ D. $\frac{11}{25}$

31. In a supermarket, each 100 g of steak costs \$16. There are four pieces of steak with weights 80 g, 110 g, 180 g and 230 g. Adam picks one piece of steak at random. Find the expected price of steak that Adam pays.

- A. \$15 B. \$24 C. \$36 D. \$96

32. Consider the following data.

x 2 3 4 6 8 y 9 15 15

If the median and the mode of the data are 8 and 15 respectively, the mean of the data is

- A. 7.75. B. 8. C. 8.5. D. 15.

33. A group of seven students have joined a test. It is given that the scores of the students are different. If one of the students knows his score and wants to guess whether he could enter the first three ranks, which information about the scores should he know?

- A. median B. mean C. maximum score D. minimum score

34. The following table shows the age distribution of a class.

Age	8 - 9	10 - 11	12 - 13	14 - 15
Frequency	11	14	22	3

Find the mean age of this class.

- A. 10.68 B. 11.18 C. 11.5 D. 11.68

35. 75 runners participated in a marathon race with the ratio of male to female is 3 : 2. Each male participant completed the race in 9 min in average while each female participant completed the race in 12 min in average. Find the mean completion time of the 75 runners.

- A. 9.6 min B. 10.2 min C. 10.5 min D. 11.1 min

36. If the median of the five numbers $x - 1, x + 1, x + 3, x + 10$ and 3 is 7, find the mean of the five numbers.

- A. 5 B. 6 C. 7 D. 8

37. $ACE0014_{16} =$

- A. $(10)16^6 + (12)16^5 + (14)16^4 + 20$.
 B. $(10)16^7 + (12)16^6 + (14)16^5 + 320$.
 C. $(11)16^6 + (13)16^5 + (15)16^4 + 20$.
 D. $(11)16^7 + (13)16^6 + (15)16^5 + 320$.

38. $O(0, 0)$, $A(5, 5)$ and $B(-4, 2)$ are the vertices of $\square OAB$ in a rectangular coordinate plane. The coordinates of the orthocentre of $\square OAB$ are

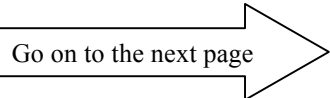
- A. $(0, 5)$. B. $(1, -3)$. C. $\left(\frac{1}{3}, \frac{7}{3}\right)$. D. $\left(-\frac{1}{2}, \frac{7}{2}\right)$.

39. If $a < b < 0$, which of the following must be true?

- A. $-a < -b$ B. $\frac{a}{b} < 1$ C. $a^2 < b^2$ D. $10^a < 10^b$

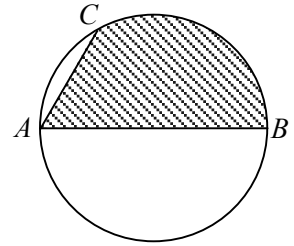
40. If $2 < x < 3$ and $3 < y < 4$, then the range of $\frac{x}{y}$ is

- A. $\frac{1}{2} < \frac{x}{y} < \frac{3}{4}$ B. $\frac{1}{2} < \frac{x}{y} < 1$ C. $\frac{2}{3} < \frac{x}{y} < \frac{3}{4}$ D. $\frac{2}{3} < \frac{x}{y} < 1$



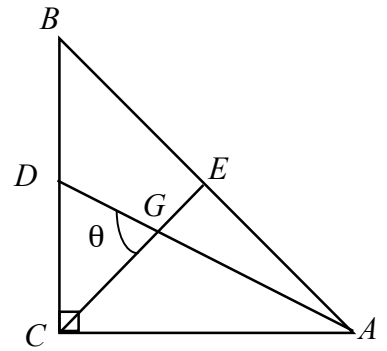
41. In the figure, AB is a diameter of the circle. If $AC = 12$ cm and $AB = 24$ cm, find the area of the shaded region.

- A. $(36 - 48\pi)$ cm²
 B. $(36 + 48\pi)$ cm²
 C. $(36\sqrt{3} - 48\pi)$ cm²
 D. $(36\sqrt{3} + 48\pi)$ cm²



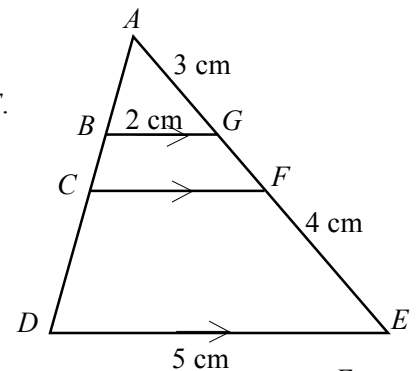
42. The figure shows the right-angled triangle ABC , where $\angle BCA = 90^\circ$, $AC = BC$ and G is the centroid of $\triangle ABC$. AG produced meets BC at D . CG produced meets AB at E . Find $\sin\theta$.

- A. $\frac{\sqrt{2}}{3}$
 B. $\frac{3\sqrt{10}}{10}$
 C. $\frac{2\sqrt{5}}{6}$
 D. $\frac{3\sqrt{5}}{5}$



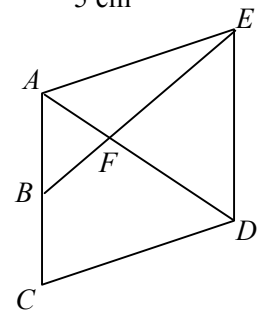
43. In the figure, $ABCD$ and $AGFE$ are straight lines and $BG \parallel CF \parallel DE$. Find CF .

- A. 4 cm
 B. 3 cm
 C. $\frac{7}{2}$ cm
 D. $\frac{7}{3}$ cm



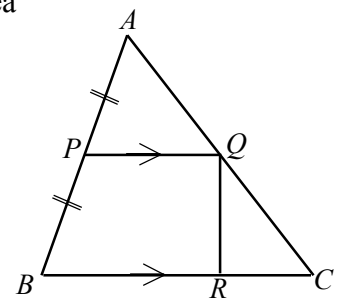
44. In the figure, $ACDE$ is a parallelogram and $AB : ED = 1 : 2$. AD and BE intersect at F . If the area of $\square ABF$ is 4 cm², then the area of $ACDE$ is

- A. 24 cm².
 B. 32 cm².
 C. 48 cm².
 D. 56 cm².



45. If $BR : RC = 2 : 1$, $PQ \parallel BC$ and the area of $\triangle APQ$ is 9 cm², find the area of the quadrilateral $BPQR$.

- A. 13 cm²
 B. 21 cm²
 C. 23 cm²
 D. 25 cm²



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