INSTRUCTIONS

1. Write down the information required in the spaces provided in the Answer Sheet.

2. When told to open this question paper, check that all questions are there. Look for the words ‘END OF PAPER’ after the last question.

3. Answer all questions. All the answers should be marked on the Answer Sheet.

4. Note that you may mark only ONE answer for each question. Two or more answers will score NO MARKS.

5. All questions carry equal marks. No marks will be deducted for wrong answers.
1. Which of following can be factorized?

A. \(4x^2 + y^2\).  B. \(4x^2 + 2xy + y^2\).  C. \(4x^2 - 2xy - y^2\).  D. \(4x^2 + 4xy + y^2\).

2. Factorize \((x + y)^2 + 6(x + y) + 9\).

A. \((x + y + 3)^2\)  B. \((x + y + 3)(x + y - 3)\)
C. \((x + y - 3)^2\)  D. \((x + y + 9)(x + y + 1)\)

3. Factorize \(x^2 - 6 - 5x\).

A. \((x - 2)(x - 3)\)  B. \((x - 6)(x + 1)\)  C. \((x - 2)(x + 3)\)  D. \((x - 6)(x - 1)\)

4. Factorize \(x^2(x + y) - y^2(y + x)\).

A. \((x + y)^3\)  B. \((x - y)^3\)  C. \((x - y)(x + y)^2\)  D. \((x + y)(x - y)^2\)

5. Factorize \(x^2 + y^2 - z^2 - 2xy\).

A. \((x - y - z)(x + y + z)\)  B. \((x + y - z)(x + y + z)\)
C. \((x + y - z)(x - y + z)\)  D. \((x - y - z)(x + y - z)\)

6. Factorize \(x^3(x - y) - y^3(y - x)\).

A. \((x - y)^2(x^2 - xy + y^2)\)  B. \((x + y)(x - y)(x^2 - xy + y^2)\)
C. \((x - y)^2(x^2 + xy + y^2)\)  D. \((x + y)(x - y)(x^2 + xy + y^2)\)

7. \(x^0 + (y^0 + z^0)^0 =\)

A. \(-1\).  B. \(0\).  C. \(1\).  D. \(2\).

8. \(\frac{2^{-3}}{(-x)^{-6}} =\)

A. \(\frac{1}{8x^6}\).  B. \(-\frac{1}{8x^6}\).  C. \(\frac{x^6}{8}\).  D. \(-\frac{x^6}{8}\).
9. \[ \left( \frac{z^7 y \times y^{-7}}{z} \right)^2 = \]

A. \( \frac{z^6}{y^9} \)  
B. \( \frac{y^9}{z^6} \)  
C. \( \frac{z^6}{y^{12}} \)  
D. \( \frac{y^{12}}{z^6} \)  

10. In AFB0E\(_{16} \), what is the place value of the digit F?

A. 16\(^1\)  
B. 16\(^2\)  
C. 16\(^3\)  
D. 16\(^4\)  

11. Which of the following binary numbers has \( 1 \times 2^2 + 1 \times 2 + 1 \times 2^4 \) as its expanded form?

A. 10110\(_2\)  
B. 10101\(_2\)  
C. 11011\(_2\)  
D. 111\(_2\)  

12. Convert 87C DA0\(_{16} \) into a decimal number expressed in scientific notation.

A. \( 89 \times 10^5 \)  
B. \( 90 \times 10^5 \)  
C. \( 9.0 \times 10^6 \)  
D. \( 8.9 \times 10^6 \)  

13. Which of the following numbers is \textbf{NOT} a rational number?

A. \( \pi \)  
B. 1.2\( \dot{3} \)  
C. \( \sqrt{9409} \)  
D. \( \frac{22}{7} \)  

14. \( 0.\dot{5}1 = \)

A. \( \frac{23}{45} \)  
B. \( \frac{17}{33} \)  
C. 0.515.  
D. 0.5151.  

15. In the diagram, BM is an arc with centre O. Find the value of the number that is represented by M.

A. 4  
B. \( \sqrt{31} \)  
C. \( \sqrt{34} \)  
D. \( 2\sqrt{7} \)
16. Express the surd \( \sqrt[3]{\frac{45}{343}} \) in its simplest form.

A. \( \frac{3\sqrt{5}}{35} \)  
B. \( \frac{3\sqrt{7}}{35} \)  
C. \( \frac{5\sqrt{3}}{49} \)  
D. \( \frac{3\sqrt{35}}{49} \)

17. Rationalize \( \frac{2}{\sqrt{2}} - \frac{\sqrt{2}}{2} \).

A. \( \sqrt{2} \)  
B. \( -\sqrt{2} \)  
C. \( -\frac{\sqrt{2}}{2} \)  
D. \( \frac{\sqrt{2}}{2} \)

18. Simplify \( 2\sqrt{12} + \sqrt{48} - \sqrt{108} \).

A. \( 3\sqrt{3} \)  
B. \( 2\sqrt{3} \)  
C. \( \sqrt{3} \)  
D. 0

19. Mr. Lee borrows $175 000 from a bank and he repays the amount after 2 years. According to the methods of calculating interest of three banks below, arrange the amount of repayments in ascending order.

Bank X: Interest rate is 6% p.a., compounded monthly.
Bank Y: Interest rate is 6% p.a., compounded half-yearly.
Bank Z: Interest rate is 6% p.a., compounded quarterly.

A. \( Y < Z < X \)  
B. \( Y < X < Z \)  
C. \( X < Z < Y \)  
D. \( X < Y < Z \)

20. Ben deposits $12 000 at a bank at an interest rate of 6% p.a. compounded half-yearly. Find the amount he will get after 2 years. (Correct your answer to the nearest ten dollars.)

A. $12 730  
B. $13 480  
C. $13 510  
D. $15 150

21. Ann deposits $9 000 at a bank at an interest rate of 4% p.a. compounded quarterly. Find the interest she will get 1 year later. (Correct your answer to the nearest dollar.)

A. $181  
B. $365  
C. $734  
D. $1 529
22. The value of a car depreciates by 15% every year. If its value is $40 000 now, what was its value 3 years ago correct to the nearest dollar?

A. $24 565      B. $26 300      C. $60 835      D. $65 133

23. The costs of labour and cloth for making a dress are $500 and $125 respectively. If the cost of labour is increased by 10% and the cost of cloth is decreased by 20%, what is the percentage change in the cost of making the dress?

A. −4%      B. −5%      C. +4%      D. +5%

24. If the population of a city increases by 4% every year, what is the percentage increase in population in 10 years correct to the nearest 1%?

A. 48%      B. 40%      C. 15%      D. 14%

25. If \( a > b \), which of the following is not true?

A. \( a + 2 > b + 2 \)      B. \( 2 - a > 2 - b \)      C. \( 2a > 2b \)      D. \( \frac{a}{2} > \frac{b}{2} \)

26. \( x = 2 \) is a solution of which of the following inequalities?

I. \( 3x - 5 \geq x - 1 \)
II. \( x - 1 < 1 \)
III. \( 2x + 1 \geq x + 6 \)

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

27. Which of the following is a solution of \( \frac{2}{3}x > 6 \)?

A. −8      B. −9      C. −10      D. 7
28. Peter’s present age is greater than two times his age fifteen years ago. What is his greatest possible present age?

A. 32       B. 31       C. 30       D. 29

29. If \( p > q > 0 \), which of the following inequalities shows the relation between

\[-4 - \frac{3}{p} \text{ and } -4 - \frac{3}{q}\]

A. \(-4 - \frac{3}{p} \leq -4 - \frac{3}{q}\)       B. \(-4 - \frac{3}{p} < -4 - \frac{3}{q}\)
C. \(-4 - \frac{3}{p} \geq -4 - \frac{3}{q}\)       D. \(-4 - \frac{3}{p} > -4 - \frac{3}{q}\)

30. Solve the inequality \(\frac{2 - 5x}{-3} > 2\).

A. \(x < 1.6\)       B. \(x > 1.6\)       C. \(x < -1.6\)       D. \(x > -1.6\)

31. A card is drawn at random from a pack of 52 playing cards. What is the probability that the card drawn is neither a king nor a diamond?

A. \(\frac{1}{3}\)       B. \(\frac{1}{13}\)       C. \(\frac{9}{13}\)       D. \(\frac{12}{13}\)

32. Three fair coins are tossed. What is the probability of getting at most 2 heads?

A. \(\frac{7}{8}\)       B. \(\frac{1}{2}\)       C. \(\frac{3}{8}\)       D. \(\frac{1}{8}\)

33. Bag A contains 6 cards which are marked with numbers from 1 to 6. Bag B contains 4 cards which are marked with numbers from 1 to 4. If a card is drawn from each bag at random, find the probability that the sum of the numbers obtained is greater than 7.

A. \(\frac{1}{4}\)       B. \(\frac{3}{4}\)       C. \(\frac{5}{12}\)       D. \(\frac{7}{12}\)
34. A die is thrown 100 times and the score of each throw is recorded. The results are shown in the table below:

<table>
<thead>
<tr>
<th>Score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>8</td>
<td>19</td>
<td>36</td>
<td>25</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

If the dice is tossed once again, find the probability of getting a number less than 3?

A. 0.08  
B. 0.27  
C. 0.36  
D. 0.63

35. The figure shows a dartboard which is divided into 21 equal squares. 3.5 marks is scored for hitting the shaded region and 7 marks for white region. If a dart, assuming that it will not hit on any boundary lines, hits the dartboard randomly, what is the expected score of each throw?

A. 7 marks  
B. 6 marks  
C. 4.5 marks  
D. 3.5 marks

36. If the median of $-2$, $-4$, 6, 8, 5 and $x$ is 3, find the value of $x$.

A. $-1$  
B.  
C. 2  
D. 1

37. The mean of 5, 7, 1, 10 and $n$ is 10. Find the value of $n$.

A. 7  
B. 10  
C. 17  
D. 27

38. Given a set of data 3, 6, 6, 6, 7, 7, 8, if 1 is subtracted from each datum, what is the new mode?

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

39. The table below shows the marks of a group of students in a Mathematics test. Find the mean mark.

<table>
<thead>
<tr>
<th>Mark</th>
<th>0 – 9</th>
<th>10 – 19</th>
<th>20 – 29</th>
<th>30 – 39</th>
<th>40 – 49</th>
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<tbody>
<tr>
<td>Frequency</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

A. 25  
B. 27  
C. 27.5  
D. 28
The following cumulative frequency polygon shows the distribution of the marks of 80 students in a Mathematics test.

Find the median mark.

A. 40  B. 39.5  C. 43  D. 44.5

~~~ END OF PAPER~~~
## QUEEN'S COLLEGE

HALF YEARLY EXAMINATION, 2008-2009

MATHEMATICS PAPER II

Secondary: 3   Date: 16TH JAN, 2009

Time: 8:30 – 9:30   (1 hour)

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### ANSWERS

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### OPTIONS

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<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
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<td>10</td>
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