Leaving Cert - Revision Sheet 3

Algebra

1. Solve the following quadratic equations

\[
\begin{align*}
x^2 + 13x + 36 &= 0 \\
2x^2 + 15x + 7 &= 0 \\
6x^2 - 9x - 4 &= 0
\end{align*}
\]

2. Solve the equation

\[
x - 7 + \frac{12}{x} = 0
\]
Co-ordinate Geometry

3. Write down the centre and radius of each of the following circles:

<table>
<thead>
<tr>
<th>(a) $x^2 + y^2 = 25$</th>
<th>(b) $x^2 + y^2 = 17$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) $(x - 2)^2 + (y + 3)^2 = 36$</td>
<td>(d) $x^2 + (y - 1)^2 = 49$</td>
</tr>
</tbody>
</table>

4. Investigate whether the point (-3,5) is on/inside/outside the circle $x^2 + (y - 2)^2 = 25$

5. Write down the equation of the following circles:

<table>
<thead>
<tr>
<th>(a) Centre (0,0) and radius 4</th>
<th>(b) Centre (-11,9) and radius 12</th>
</tr>
</thead>
</table>
Statistics

6. Twenty people attended a party. Their ages are summarised in the following stem-and-leaf diagram.

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1, 3, 4, 5, 6, 9</td>
</tr>
<tr>
<td>2</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>3</td>
<td>3, 8</td>
</tr>
<tr>
<td>4</td>
<td>4, 5, 6, 7, 8</td>
</tr>
<tr>
<td>5</td>
<td>1, 6, 7</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Key: 1|4 = 14

Calculate the Inter-Quartile Range

Patterns / Sequences

7. For each of the sequences below, name the type of sequence, and write down the next two terms in the sequence:

(i) 5, 12, 19, 26, ...

(ii) 8, 15, 26, 41, 60
8. In an arithmetic sequence 18, 15, 12, ... how many terms of the sequence are positive?

Numbers

9. John earns €965 per week. His standard rate cut-off point is €675; the standard rate of income tax is 22% and the higher rate is 42%. If he has tax credits of €80 per week, calculate his total tax bill.

10. A businessman exchanged €4,500 for Swedish Krone. He received 39 510 Krone.
   (a) What was the exchange rate?
   (b) The next week, he converted the Krone back into euro at a rate of €1 = 8.44 Krone. How much did he receive in euro?
   (c) What was the percentage profit on these transactions?
11. Use the Trapezoidal Rule to estimate the area of the following shape:

```
  5 4 5 7 4 9 6
  4 4 4 4 4 4
```

Inferential Statistics

12. A dairy company which produces milk claims that 85% of people prefer their “Special” milk over their competitors’ brands. The Department of Food carries out a survey to test their claim. They survey 500 people, and 402 of them say that they prefer “Special” milk.

(a) What is the margin of error in the survey?

(b) Carry out a confidence interval

(c) Hence, examine the company’s claim using the evidence from the survey.
Geometry / Trigonometry

13. Calculate the length of the sides marked with a letter in the following diagrams:
Leaving Cert - Revision Sheet 3

Algebra

1. Solve the following quadratic equations

\[ x^2 + 13x + 36 = 0 \]
\[ (x + 4)(x + 9) = 0 \]
\[ x = -4 \quad x = -9 \]

\[ (2x^2 + 15x + 7) = 0 \]
\[ (2x + 1)(x + 7) = 0 \]
\[ 2x = -1 \quad x = -7 \]
\[ x = -\frac{1}{2} \]

\[ \frac{(ax)^2 + (bx) + c}{6x^2 - 9x - 4} = 0 \]
\[ a = 6 \quad b = -9 \quad c = -4 \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]
\[ = \frac{9 \pm \sqrt{(-9)^2 - 4(6)(-4)}}{2(6)} \]
\[ = \frac{9 \pm \sqrt{177}}{12} \]
\[ = 1.86 \quad -0.36 \]

2. Solve the equation

\[ x - 7 + \frac{12}{x} = 0 \]

\[ x^2 - 7x + 12 = 0 \]
\[ (x - 3)(x - 4) = 0 \]
\[ x = 3 \quad x = 4 \]
Co-ordinate Geometry

3. Write down the centre and radius of each of the following circles:

<table>
<thead>
<tr>
<th>(a) $x^2 + y^2 = 25$</th>
<th>(b) $x^2 + y^2 = 17$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C(0,0)$</td>
<td>$C(0,0)$</td>
</tr>
<tr>
<td>$r = 5$</td>
<td>$r = \sqrt{17}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c) $(x - 2)^2 + (y - 3)^2 = 36$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C(2,3)$</td>
</tr>
<tr>
<td>$r = 6$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(d) $x^2 + (y - 1)^2 = 49$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C(0,1)$</td>
</tr>
<tr>
<td>$r = 7$</td>
</tr>
</tbody>
</table>

4. Investigate whether the point (-3,5) is on/inside/outside the circle $x^2 + (y - 2)^2 = 25$

$$(-3)^2 + (5-2)^2 \leq 25$$

$$9 + 9 \underline{=} 25$$

18 < 25

INSIDE

5. Write down the equation of the following circles:

<table>
<thead>
<tr>
<th>(a) Centre $(0,0)$ and radius 4</th>
<th>(b) Centre $(-11,9)$ and radius 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2 + y^2 = 16$</td>
<td>$(x + 11)^2 + (y - 9)^2 = 144$</td>
</tr>
</tbody>
</table>
6. Twenty people attended a party. Their ages are summarised in the following stem-and-leaf diagram.

```
<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1, 2, 3, 4, 5, 6, 7, 8, 9</td>
</tr>
<tr>
<td>2</td>
<td>1, 3, 5, 8, 9, 11, 13, 14</td>
</tr>
<tr>
<td>3</td>
<td>1, 3, 8</td>
</tr>
<tr>
<td>4</td>
<td>2, 4, 5, 6, 7, 8</td>
</tr>
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<td>5</td>
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<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>
```

Key: 1|4 = 14

Calculate the Inter-Quartile Range

\[
IQR = Q_3 - Q_1 = 47.5 - 17.5 = 30
\]

Patterns / Sequences

7. For each of the sequences below, name the type of sequence, and write down the next two terms in the sequence:

(i) 5, 12, 19, 26, ...

\[7, 7, 7\]

LINEAR / ARITHMETIC

(ii) 8, 15, 26, 41, 60

\[7, 11, 15, 19, 23, 27\]

QUADRATIC
8. In an arithmetic sequence 18, 15, 12, ... how many terms of the sequence are positive?

\[ T_n = -3n + 21 = 0 \]

\[ 21 = 3n \]

\[ n = 7 \]

**Positive Terms:** 6

Numbers

9. John earns €965 per week. His standard rate cut-off point is €675; the standard rate of income tax is 22% and the higher rate is 42%. If he has tax credits of €80 per week, calculate his total tax bill.

\[
\begin{align*}
965 - 675 &= 290 \\
675 &\times 0.22 = 148.50
\end{align*}
\]

\[ \frac{270.30 - 80}{190.30} \]

10. A businessman exchanged €4,500 for Swedish Krone. He received 39,510 Krone.

(a) What was the exchange rate?

\[ \frac{39510}{4500} = 8.78 \]

\[ \text{€1} = 8.78 \text{KR} \]

(b) The next week, he converted the Krone back into euro at a rate of €1 = 8.44 Krone. How much did he receive in euro?

\[ \frac{39510}{8.44} = \text{€4,681.28} \]

(c) What was the percentage profit on these transactions?

\[ \frac{4681.28 - 4500}{4500} \times 100 = 4.03\% \]
11. Use the Trapezoidal Rule to estimate the area of the following shape:

\[ A = \frac{h}{2} \left[ \text{First + Last + 2(Others)} \right] \]

\[ \approx \frac{4}{2} \left[ 5 + 6 + 2(4+5+7+4-9) \right] \]

\[ = 138 \]

**Inferential Statistics**

12. A dairy company which produces milk claims that 85% of people prefer their “Special” milk over their competitors’ brands. The Department of Food carries out a survey to test their claim. They survey 500 people, and 402 of them say that they prefer “Special” milk.

(a) What is the margin of error in the survey?

\[ \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{500}} < 0.045 \quad 4.5\% \]

(b) Carry out a confidence interval

\[ \hat{p} = \frac{402}{500} = 0.804 \]

(b) Carry out a confidence interval

\[ -0.045 \quad \hat{p} \quad +0.045 \]

CLM: 0.85

\[ 0.759 \quad 0.804 \quad 0.849 \]

(c) Hence, examine the company’s claim using the evidence from the survey.

**REJECT THE COMPANY’S CLAIM**

**AS 85% IS OUTSIDE OUR CONFIDENCE INTERVAL.**
13. Calculate the length of the sides marked with a letter in the following diagrams:

First diagram:
\[ x^2 + 7^2 = 25^2 \]
\[ x^2 + 49 = 625 \]
\[ x^2 = 576 \]
\[ x = 24 \]

Second diagram:
SOH CAH TOA
\[ \sin 29 = \frac{y}{50} \]
\[ 0.4848 = \frac{y}{50} \]
\[ 50 \times 0.4848 = y \]
\[ y = 24.24 \]

Third diagram:
\[ 30 + 25 = 55 \]
\[ 180 - 55 = 125 \]
\[ \frac{x}{\sin 125} = \frac{10}{\sin 25} \]
\[ \frac{x}{0.8192} = 23.6620 \]
\[ x = 23.6620 \times 0.8192 \]
\[ x = 19.38 \]