**Mathematics 20-1: Final Exam**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This exam consists of 24 multiple choice questions worth 2 marks each and 8 written response questions worth a total of 26 marks. There is a tear-off formula sheet at the back of the exam.

**Multiple Choice Answer Section** *(48 marks)*

Place the letter corresponding to the best answer on the line.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
 | 1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
 | 1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
 | 1. \_\_\_\_\_
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| **Scoring Guide: To Be Filled Out By Teacher** |
| **Unit** | **Multiple ChoiceQuestions** | **MCScore** | **Written Questions** | **Written Score** | **TotalMark** | **Score onFinal Exam** |
| 1: Sequences & Series | 1 – 3 | /6 | 1 | /4 | /10 |  |
| 2: Trigonometry | 4 – 6 | /6 | 2 | /3 | /9 |  |
| 3: Quadratic Functions | 7 – 10 | /8 | 3 | /3 | /11 |  |
| 4: Quadratic Equations | 11 – 12 | /4 | 4 | /3 | /7 |  |
| 5: Radical Expressions & Equations | 13 – 14 | /4 | 5 | /3 | /7 |  |
| 6: Rational Expressions & Equations | 15 – 17 | /6 | 6 | /3 | /9 |  |
| 7: Absolute Value & Reciprocal Functions | 18 – 21 | /8 | 7 | /4 | /12 |  |
| 8: Systems of Equations | n/a | n/a | 8 | /3 | /3 |  |
| 9: Linear & Quadratic Inequalities | 22 – 24 | /6 | n/a | n/a | /6 |  |
| Totals: |  | /48 |  | /26 | /74 |  |

**Mathematics 20-1 Final Exam**

**Multiple Choice Questions** *(2 marks each)*

Record your answers on the front cover of the exam.

1. What are the missing terms of the **arithmetic** sequence: \_\_, 3, 9, \_\_, \_\_?
	1. 1, 27, 81
	2. 9, 3, 9
	3. -6, 12, 17
	4. -3, 15, 21
2. What is the sum of the first five terms of the geometric series 16 807 – 2401 + 343 – ...?
	1. 19 607
	2. 14 707
	3. 16 807.29
	4. 14 706.25
3. The 20th term of a geometric sequence is 524 288 and the 14th term is 8192. The value of the third term could be
	1. 4 only
	2. 8 only
	3. +4 and -4
	4. +8 and -8
4. Which angle in standard position has a different reference angle than all the others?
	1. 125°
	2. 155°
	3. 205°
	4. 335°
5. Which is the exact value of cos 150°?
	1. $\frac{1}{2}$
	2. $\frac{\sqrt{3}}{2}$
	3. $-\frac{\sqrt{3}}{2}$
	4. $-\frac{1}{2}$
6. The expression that could be used to determine the measure of angle $θ$ in the diagram is:
	1. $\frac{\sin(θ)}{70}=\frac{\sin(28)}{34}$

28°

34 cm

70 cm

$$θ$$

* 1. $θ^{2}=34^{2}+70^{2}-2\left(34\right)\left(70\right)\cos(28°)$
	2. $\cos(θ=)$ $\frac{70^{2}+34^{2}-28^{2}}{2\left(70\right)(34)}$
	3. $\frac{\sin(θ)}{34}=\frac{\sin(28)}{70}$
1. What points on the graph of this quadratic function
 represent the locations of the zeros of the function?



* 1. (0, 5) and (1, 0)
	2. (0, 1) and (0, 5)
	3. (1, 0) and (5, 0)
	4. (5, 0) and (0, 1)
1. Which function is NOT a quadratic function?
	1. $f\left(x\right)=2\left(x+2\right)^{2}-7$
	2. $f\left(x\right)=\left(x-3\right)\left(2x+5\right)$
	3. $f\left(x\right)=5x^{2}-20$
	4. $f\left(x\right)=3\left(x-9\right)+6$
2. Identify the range for the function $y=-6\left(x-6\right)^{2}+6$.
	1. $\left\{y\leq 6,y\in R\right\}$
	2. $\{y│y\geq 6,y\in R\}$
	3. $\left\{y\leq -6,y\in R\right\}$
	4. $\left\{y\geq -6,y\in R\right\}$
3. What conditions on *a* and *q* will give the function $f\left(x\right)=a\left(x-p\right)^{2}+q$ have no *x*-intercepts?
	1. $a>0$ and $q>0$
	2. $a<0$ and $q>0$
	3. $a>0$ and $q=0$
	4. $a<0$ and $q=0$
4. What is one of the factors of $x^{2}-3x-10$?
	1. $x-5$
	2. $x+5$
	3. $x-10$
	4. $x+10$
5. The roots, to the nearest hundredth, of $-\frac{1}{2}x^{2}+x+\frac{7}{2}$ are
	1. 1.83 and 3.83
	2. -1.83 and 3.83
	3. 1.83 and -3.83
	4. -1.83 and -3.83
6. What is the entire radical form of $-3\left(\sqrt[3]{2}\right)$?
	1. $\sqrt[3]{54}$
	2. $\sqrt[3]{18}$
	3. $\sqrt[3]{-18}$
	4. $\sqrt[3]{-54}$
7. What is the simplest form of the expression $-2x\sqrt{6x}+5x\sqrt{6x}, x\geq 0$?
	1. $3\sqrt{6x}$
	2. $6\sqrt{12x}$
	3. $3x\sqrt{6x}$
	4. $6x\sqrt{12}$
8. Simplify the rational expression $\frac{x^{2}-7x+6}{x^{2}-2x-24}$ for all permissible values of *x*.
	1. $\frac{x+1}{x-4}$
	2. $\frac{x-1}{x+4}$
	3. $\frac{x+1}{x+4}$
	4. $\frac{x-1}{x-4}$
9. Simplify $\frac{8}{3y}+\frac{5y}{4}-\frac{5}{8}$ for all permissible values of *y*.
	1. $\frac{30y^{2}-15y+64}{24y}$
	2. $\frac{30y^{2}+79}{24y}$
	3. $\frac{15y^{2}+64}{24y}$
	4. $\frac{5y+3}{24y}$
10. Determine the solution(s) of the equation $\frac{x}{x^{2}+6x+5}=\frac{2}{x^{2}-1}$.
	1. $x=-2, x=5$
	2. $x=-5, x=-1, x=1$
	3. $x=-2, x=3$
	4. $x=2$
11. The value of the expression $\left|-9-3\right|-\left|5-2^{3}\right|+\left|-7+1-4\right|$ is
	1. 13
	2. 19
	3. 21
	4. 25
12. The range of the function $f\left(x\right)=\left|x-3\right|$ is
	1. $\left\{y>3, y\in R\right\}$
	2. $\left\{y\geq 3, y\in R\right\}$
	3. $\left\{y\geq 0, y\in R\right\}$
	4. $\left\{y>0, y\in R\right\}$
13. The absolute value equation $\left|1-2x\right|=9$ has solution(s):
	1. *x* = -4
	2. *x* = 5
	3. *x* = -5 and *x* = 4
	4. *x* = -4 and *x* = 5
14. One of the vertical asymptotes of the graph of the reciprocal function $y=$ $\frac{1}{x^{2}-16}$ is:
	1. *x* = 0
	2. *x* = 4
	3. *x* = 8
	4. *x* = 16
15. What linear inequality does the graph show?



* 1. $y\leq \frac{3}{4}x+4$
	2. $y\geq \frac{3}{4}x+4$
	3. $y<\frac{3}{4}x+4$
	4. $y>\frac{3}{4}x+4$
1. What is the solution set for the quadratic inequality $6x^{2}-7x-20<0$?
	1. $\left\{x\leq -\frac{4}{3} or x\geq \frac{5}{2}, x\in R\right\}$
	2. $\left\{-\frac{4}{3}\leq x\leq \frac{5}{2}, x\in R\right\}$
	3. $\left\{-\frac{4}{3}<x<\frac{5}{2}, x\in R\right\}$
	4. $\left\{x<-\frac{4}{3} or x>\frac{5}{2}, x\in R\right\}$



1. For the quadratic function *q*(*x*) shown in the graph,
which of the following is true?
	1. There are no solutions to $q\left(x\right)>0$.
	2. All real numbers are solutions to $q\left(x\right)\geq 0$.
	3. All real numbers are solutions to $q\left(x\right)\leq 0$.
	4. All positive real numbers are solutions to $q\left(x\right)<0$.

**Written Response** *(marks as indicated)*

Record your answers below. Remember to show all your work.

1. Consider the sequence 5, \_\_, \_\_, \_\_, \_\_, 160.
	1. Assume the sequence is **arithmetic**. Determine the unknown terms of the sequence.
	2. What is the general term of the arithmetic sequence?
	3. Assume the sequence is **geometric**. Determine the unknown terms of the sequence.
	4. What is the general term of the geometric sequence?

/4

1. In ΔPQR, ∠P = 56°, *p* = 10 cm, and *q* = 12 cm.
	1. Sketch a diagram of the triangle.
	2. Determine the length of the unknown angles to the nearest degree.
	3. Determine the measures of the unknown side to the nearest tenth of a centimetre.

/3

1. Write the quadratic function $y=3x^{2}+36x+13$ in the form $ y=a\left(x-p\right)^{2}+q$ by completing the square.

/3

1. Solve the quadratic equation $3x^{2}+5x+1$ using the quadratic formula. Express your answers as exact roots.

/3

1. Given the equation $x-4=\sqrt{x+2}$
	1. Solve the equation.
	2. State any extraneous roots.
	3. Identify the values of *x* for which the radical is defined.

/3

1. Given the equation $2-$ $\frac{5}{x^{2}-x-6}=\frac{x+3}{x+2}$,
	1. Solve the equation.
	2. Identify all non-permissible values.

/3

1. Consider the function $f\left(x\right)=\left|2x-7\right|$.
	1. Sketch the graph of the function on the grid
	to the right.



* 1. Determine all the *x*- and *y*-intercepts.
	2. State the domain and range.
	3. What is the piecewise notation form of the function?

/4

1. Solve the following system algebraically.

$$y=7x-11$$

$$5x^{2}-3x-y=6$$

/3