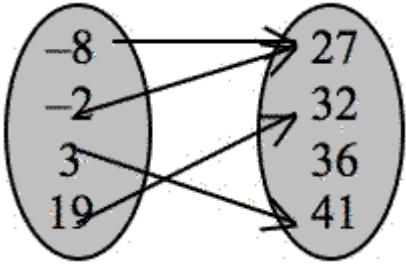


Part A: Multiple Choice: 10 marks

Answers must be placed in the space provided. It is not necessary to show work. Each question is worth one mark.

1. Which relation is a function?
a. $\{(-3, -2), (-1, 3), (0, -2), (3, 4)\}$
b. $\{(0, 1), (3, 2), (5, -3), (0, 2)\}$
c. $\{(-7, -7), (-2, 5), (-1, 6), (-2, -5)\}$
d. $\{(-4, -7), (-9, 5), (4, -2), (-9, 0)\}$
1. _____

2. What are the domain and range of the relation?
2. _____



- a. Domain = $\{27, 32, 41\}$
Range = $\{-8, -2, 3, 19\}$
b. Domain = $\{-8, -2, 3, 19\}$
Range = $\{27, 32, 36, 41\}$
c. Domain = $\{-8, -2, 3, 19\}$
Range = $\{27, 32, 41\}$
d. Domain = $\{27, 32, 36, 41\}$
Range = $\{-8, -2, 3, 19\}$

3. Which of the following transformations is required to graph $y = \sqrt{-x - 6}$ from its parent function?
3. _____

- a. Reflect the graph $f(x) = \sqrt{x}$ in the x -axis, then translate it 6 units to the left.
b. Reflect the graph $f(x) = \sqrt{x}$ in the y -axis, then translate it 6 units to the right.
c. Reflect the graph $f(x) = \sqrt{x}$ in the y -axis, then translate it 6 units to the left.
d. Reflect the graph $f(x) = \sqrt{x}$ in the x -axis, then translate it 6 units to the right.

4. Which pair of functions is equivalent?
4. _____

- a. $f(x) = 7(9x^2 + 12) + 3(8x^2 - 23)$
 $g(x) = 6(5x^2 + 11) + 10(4x^2 - 9)$
b. $f(x) = (14x^2 + 5x) + (8x^2 + 19x)$
 $g(x) = 22x^2 + 23x$
c. $f(x) = (14x^2 - 5x) - (2x^2 + 8x)$
 $g(x) = 12x^2 + 3x$
d. $f(x) = 3(15x^2 - 11) + (19x^2 - 79)$
 $g(x) = 6(6x^2 - 10) - 4(13 - 7x^2)$

5. Which of the following represents factoring $g^3 + 5g^2 + 2g + 10$ by grouping?
5. _____

- a. $g^2(g + 5) + 2(g + 5)$
b. $(g^2 + 5) + (2g + 5)$
c. $(g + 5)^3$
d. $(g + 5)(g + 5) + (g + 2)(g + 2)$

6. The Canada Calendar Company reduces the prices of its calendars each January.
6. _____

The function $f(x) = -25(x - 9)^2 + 200$ models the company's profits, where x is the price of a calendar in dollars. At what calendar price will the company receive maximum profits?

- a. \$5
b. \$9
c. \$10
d. \$15

7. For what value(s) of k will the function $g(x) = x^2 + kx + 1$ have only one zero?
7. _____

- a. 0
b. 2
c. -2, 2
d. No values will work

8. Determine the value of θ to the nearest degree if $\cot \theta = 2$.

8. _____

a. 51°

c. 27°

b. 45°

d. 63°

9. Determine the number of terms in the sequence: 5240, 4365, 3490, 2615, ..., -2635.

9. _____

a. 8

c. 11

b. 10

d. 9

10. What is the common ratio for a principal, $\$P$, invested in an account that compounds annually for n years at $1\%/a$?

10. _____

a. $P(1+i)$

c. $n-1$

b. $1+i$

d. $A-P$
- Part B: Fill in the blanks: 15 marks**
- Answers must be placed in the space provided. It is not necessary to show work. Each question is worth one mark.
11. State the domain for the following function: $y = \sqrt{x-7}$

11. _____

12. Given the point $(2,-5)$ on $y = f(x)$, what would be the image of the point under the following transformation: $y = 2f(\frac{1}{3}x)$

12. _____

13. Simplify the following expression: $\frac{m^2 + 2m - 15}{2m^2 + 5m - 25}$

13. _____

14. Evaluate: $125^{\frac{-2}{3}}$ (No decimals)

14. _____

15. Write the recursive sequence for 3,12,48,192,...

15. _____

16. What is the horizontal asymptote of the function $y = 4^x - 3$?

16. _____

17. What is the principal angle of 875° ?

17. _____

18. State the period of the function $y = 2\sin 4\theta - 5$ in degrees.

18. _____

19. What is the exact value of $\cot 240^\circ$?

19. _____

20. How much simple interest is on a deposit of $\$750$ at $4\%/a$ for 121 days?

20. _____

21. Given $t_n = -2n + 11$, calculate t_4 .

21. _____

22. Express $\sqrt{80x^3}$ as a mixed radical in lowest terms.

22. _____

23. What is the inverse of the function $f(x) = 2x - 5$?

23. _____

24. What is the value of $\sec 27^\circ$ to one decimal place?

24. _____

25. What is the next term in the sequence: 1,2,3,6,11,20,37, _____.

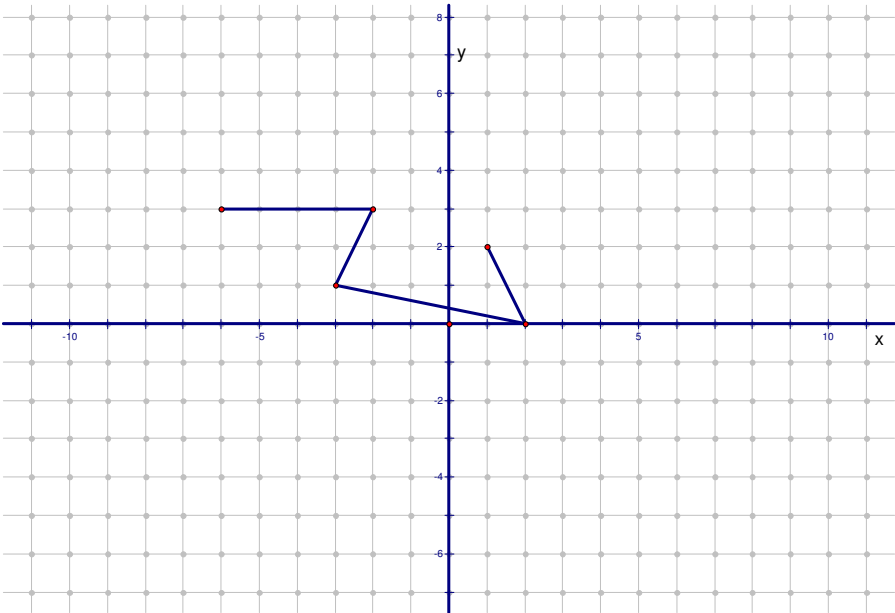
25. _____
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Part C: Full Solutions

Answer the following questions in the space provided. Complete solutions are required and all answers should be expressed in their simplest form.

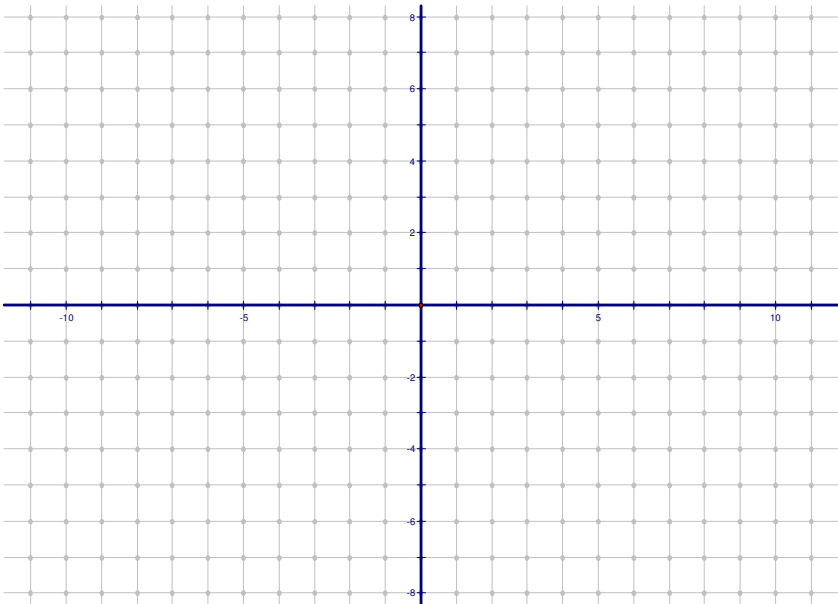
1. Given the graph $y = f(x)$, sketch $y = f - \frac{1}{2}(x - 1) + 3$. State all of the transformations.

[6]



2. Determine the point(s) of intersection of the functions $f(x) = -3x^2 + 6x + 4$ and $g(x) = 3x - 2$ algebraically and by graphing.

[6]



3. Simplify and state any restrictions on the variables:

$$\frac{6x}{x^2 - 5x + 6} - \frac{3x}{x^2 + x - 12}$$

[4]

4. Determine the equation of the quadratic function in standard form that has roots $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$ and passes through the point $(1,4)$. [4]

5. A bus company has 3000 passengers daily, each paying a fare of \$2. For each \$0.10 increase, the company estimates that it will lose 30 passengers per day. If the company needs to take in \$9072 per day to stay in business, what range of fares should be charged? [4]

6. A piece of rock contains 4.6 grams of Carbon. Scientists estimate that it originally contained 234 grams of carbon. Determine the age of the rock if the half life is 120 years. [4]

7. A cup of hot liquid was left to cool in a room whose temperature was 19°C . The temperature changes with time according to the function $T(t) = 81\left(\frac{1}{2}\right)^{\left(\frac{t}{30}\right)} + 19$. Use your knowledge of transformations to sketch this function. Explain the meaning of the y-intercept and the asymptote in the context of this problem. [4]
8. Point $(-7, -24)$ is on the terminal arm of the angle θ in standard position.
- Sketch the principal angle θ . [1]
 - What is the value of $\cos \theta$. [1]
 - What is the measure of the related acute angle to the nearest degree? [1]
 - What is the measure of θ to the nearest degree? [1]
9. Solve for θ to the nearest degree, if $\cos \theta = -0.3341$, where $-180^{\circ} \leq \theta \leq 360^{\circ}$. [4]
10. Prove the following identity:
- $$\tan \theta + \frac{1}{\tan \theta} = \frac{1}{\sin \theta \cos \theta} \quad [4]$$
11. Two forest fire stations, P and Q, are 20 km apart. A ranger at station Q sees a fire 17 km away. If the angle between the line PQ and the line from P to the fire is 24° , how far, to the nearest tenth of a kilometre, is station P from the fire? There are 2 answers. [6]
12. The average monthly temperature, $T(t)$, in degrees Celsius in Ottawa, Ontario, can be modelled by the function $T(t) = 15.4 \sin 30(t - 4.2)^{\circ} + 4.7$, where t represents the number of months. For $t = 1$, the month is January; for $t = 2$, the month is February; and so on.
- What is the period and what does this represent? [1]
 - What is the temperature range in Ottawa? [1]
 - What is the average temperature in Ottawa? [1]
 - When does the temperature reach 17°C ? [4]
13. Determine the number of terms in the following arithmetic sequence:
 $-226, -195, -164, -133, \dots, 549$. (Show appropriate work) [4]
14. Ernie bought a plasma TV for \$500 down and 36 monthly payments of \$60 each. The first payment is due at the beginning of next month.
- The interest is 12%/a compounded monthly. What is the selling price of the TV? [3]
 - Because of the financing, how much interest did Ernie pay? [2]
15. Expand and simplify the first three terms of $(2x - 4y)^9$. [4]
16. Every three months, Mr. Anderson deposited \$400 in a savings account that paid 6%/a, compounded quarterly. He made the first deposit when his son was three months old and he made the last deposit on his son's 17th birthday. The money remained in the account until his son turned 23, when Mr. Anderson gave him the money. How much did he receive? [4]
17. Given the quadratic function $f(x) = 2(x + 1)^2 - 3$,
- graph $f(x)$ and its inverse. [2]
 - determine the equation of the inverse. [2]

