

Teachers:

Date:

Time:

Page 1 of 5

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

- Notes:
- 1) Circle your teacher's name.
  - 2) Programmable and graphing calculators are not permitted.
  - 3) Your clarity and correctness of written expression will be taken into account in determining the final mark for this exam.
  - 4) A communication mark for the exam will be based on:

Since this is an old exam for the old MCR 3U1 course, you should also work on the following textbook questions:

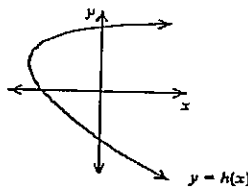
p. 10 # 7, 8 & p. 59 # 13, 14 & p. 212 # 6

also work on "Radical Expressions" and complete all assigned review!

**Part A:** Place your answer on the space to the right of the question.

{One Mark Each}

1. Determine  $t_5$  if  $t_n = \frac{4n^2 + 3}{7n - 2}$  (exact answer).
2. State the general term of: -3, 5, 13, 21, ....
3. Evaluate: (no decimal answers)
  - a)  $64^{-\frac{1}{6}}$
  - b)  $\left(\frac{27}{125}\right)^{\frac{2}{3}}$
4. How much will there be in an account at the end of five years if \$4000 is invested at 9.6%/a compounded monthly?
5. If  $f(x) = \sqrt{x-5}$ , then:
  - a)  $f(41) =$
  - b) the domain of  $f$  is
  - c) the range of  $f$  is
6. Is  $y = h(x)$  a function? Why or why not?



7. State the restrictions on the variable:  $\frac{2b+1}{3b(5b-8)}$

8. \_\_\_\_\_

9. If  $\theta = -125^\circ$ , then:
  - a) The related acute angle is
  - b) The principal angle is

10. [REDACTED]

11. For the function  $y = 5\sin\left[2\left(\theta - \frac{4\pi}{3}\right)\right] - 3$ , state the:

a) period

b) phase shift

c) minimum value

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12. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

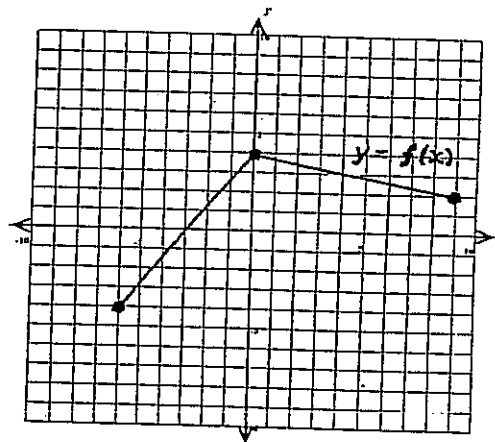
[REDACTED]

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**Part B:** Graph the following on the grids below.

1. Graph  $y = -2f(x+3) + 1$  given the graph of  $y = f(x)$  below.

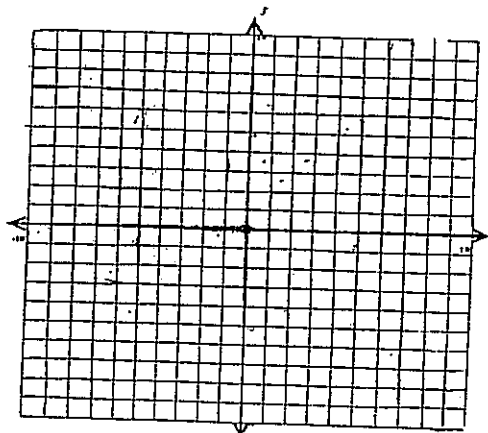
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2. [REDACTED]

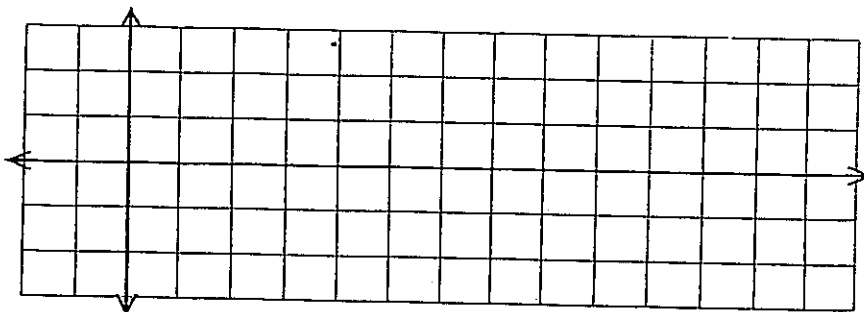
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Graph  $y = -3(x^2 + 1)$



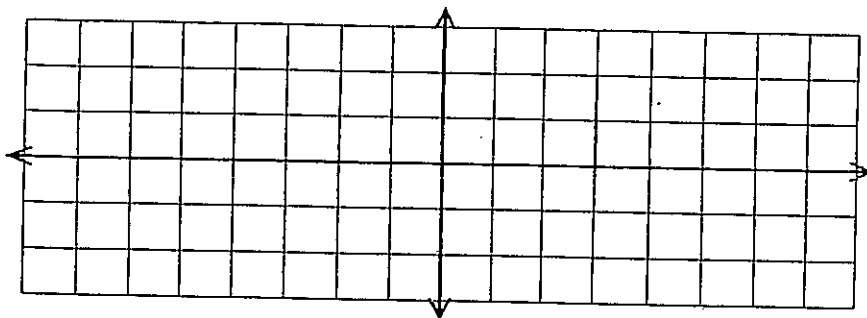
3. Graph:  $y = \cos(2\theta) + 1$  for  $0 \leq \theta \leq 360^\circ$

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4. Graph:  $y = -3\sin(\theta + 45^\circ)$  for two periods.

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**Part C:** Write complete solutions in the space provided.

1. Determine the sum of the first eleven terms of the series:  $36 - 108 + 324 - 972 + \dots$

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2. Ali would like to buy a car worth \$21 000 in five years. What regular amount does she need to deposit, at the end of every six months, into an account that earns 5.2%/a compounded semi-annually?

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3. If  $f(x) = 2x - 6$ , determine the equation of

a)  $y = f^{-1}(x)$

b) 

c) 

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4. Describe the transformations that occur on  $y = h(x)$  to give  $y = 3h(-2x + 14) - 5$ .

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5. Simplify:

a)  $\frac{(8x^6)^{\frac{1}{3}}}{4x^{-1}}$

b)  $\frac{y^2 - 9}{y^2 - 2y - 15} \times \frac{4y^2 - 20y}{2y - 6}$

c)  $\frac{3t}{t^2 + 4t - 21} + \frac{5}{t - 3}$

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6. Solve the following equations:

a) 

b)  $2x^2 - 9x + 6 = 0$

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c)  $\cos \theta = -\frac{3}{4} \quad 0 \leq \theta \leq 360^\circ$   
(two decimal places)

d) 

7. A profit function is given by:  $P(x) = -5x^2 + 20x + 37$ , where  $P(x)$  is in dollars. Determine the maximum profit.

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8. Prove that  $\tan \theta + \frac{1}{\tan \theta} = \frac{1}{\sin \theta \cos \theta}$ .

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9. The height above the ground of a ferris wheel seat is given by:

$$h = -16 \cos\left(\frac{360}{20}t\right) + 17, \quad h \text{ in metres and } t \text{ in seconds.}$$

- a) What is the amplitude and what characteristic of the ferris wheel does it represent?
- b) How long will it take the ferris wheel seat to complete seven revolutions?
- c) What maximum height will a seat reach above the ground?

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10. Determine the height ( $h$ ) of the mountain in the diagram below to one decimal.  
Note: Diagram is not drawn to scale.

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