

Formulas:	Quadratics: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Finance:	$A = P(1 + i)^n$ $I = PRT$ $FV = \frac{R[(1+i)^n - 1]}{i}$
Trigonometry: SOHCAHTOA	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
	$a^2 = b^2 + c^2 - 2bc \cos A$ $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Part A: Choose the best answer to fill into the scantron card for the questions in PartA. [30]

- \$1000 is invested at 3% per year compounded annually for 4 years. The 'i' value for the formula is
 - 8
 - 12
 - 4
 - 1
- \$5000 is invested at 4.5% per year compounded quarterly for 3 years. The 'i' value for the formula is
 - 0.1125
 - 0.01125
 - 0.45
 - 4.5
- \$200 is invested at 4% per year compounded semi-annually. The amount obtained after 5 years is
 - \$243.33
 - \$240.00
 - \$243.80
 - \$244.04
- \$300 is invested at 4% per year compounded semi-annually. The total interest after 5 years is
 - \$65.00
 - \$60.00
 - \$66.06
 - \$65.70
- -8^0 is equal to
 - 1
 - 1
 - 0
 - $\frac{-1}{8}$
- $64^{\frac{1}{2}}$ is equal to
 - 32
 - 4
 - 8
 - 16
- $\left(\frac{1}{2}\right)^{-5}$ is equal to
 - $\frac{1}{10}$
 - $\frac{1}{32}$
 - 32
 - 32

8. $\left(\frac{25}{64}\right)^{\frac{3}{2}}$ is equal to
- | | |
|----------------------|----------------------|
| a. $\frac{125}{512}$ | c. $\frac{256}{125}$ |
| b. $\frac{125}{256}$ | d. $\frac{512}{125}$ |

The spreadsheet below shows the first seven months of an ordinary annuity.

Period	Balance	Interest	Payment	New Balance
1	\$0.00	\$0.00	\$75.00	\$75.00
2	\$75.00	\$1.13	\$75.00	\$151.13
3	\$151.13	\$2.27	\$75.00	\$228.39
4	\$228.39	\$3.43	\$75.00	\$306.82
5	\$306.82	\$4.60	\$75.00	\$386.42
6	\$386.42	\$5.80	\$75.00	\$467.22
7	\$467.22	\$7.01	\$75.00	\$549.22

9. The periodic payment including principal and interest is
- \$549.22
 - \$151.13
 - \$75
 - increasing each month
10. If the periodic payment is monthly, the monthly rate of the investment is
- 1.13%
 - 2%
 - 1.5%
 - 18%
11. An ordinary annuity
- consists of equal payments
 - consists of payments made at equal time intervals
 - is both a and b
 - is neither a nor b
12. Given an annuity with monthly payments for 2.5 years, the value for n in the annuity formula is
- 32
 - 30
 - 24
 - 28
13. The amount that is invested now to yield a larger amount in the future is called the
- accumulated amount
 - present value
 - interest
 - annuity
14. The following is not an example of an annuity
- repaying a loan with equal monthly payments
 - repaying a loan with equal weekly payments
 - repaying a loan with a lump sum payment
 - repaying a loan with two equal yearly payments
15. If a loan is repaid with payments every 3 months for 6.5 years, the total number of payments is
- 26
 - 24
 - 12
 - 20

16. When using the TVM solver on the TI 83+, **PMT END** represents
- payments are at the beginning of the interval
 - end the programme
 - take the payments to the end of the time
 - payments are at the end of the interval

17. The relation that is also a function is
- $\{(2, 3), (-2, 3), (3, 2), (3, -2)\}$
 - $\{(-1, 2), (-2, 1), (-2, 2), (2, 1)\}$
 - $\{(1, 4), (4, 1), (-1, 3), (4, -1)\}$
 - $\{(2, -1), (-1, 2), (3, 5), (5, 3)\}$

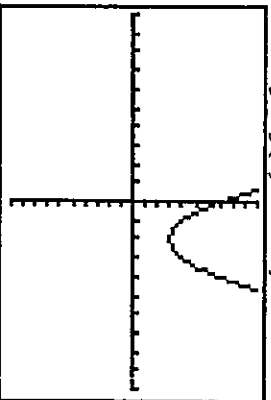
18. The relation that is also a function is
- $x^2 + y^2 = 25$
 - $y^2 = x$
 - $y = x^2$
 - $x^2 - y^2 = 25$

19. Given $f(x) = x^2 - 5x + 3$, then
- $f(-1) = -3$
 - $f(-1) = 7$
 - $f(-1) = -1$
 - $f(-1) = 9$

20. Which of the following statements is not true for the quadratic function $y = 4x^2 - 20x - 24$?
- The function has a minimum.
 - The x-coordinate of the vertex is $-\frac{5}{2}$.
 - The factored form is $4(x + 1)(x - 6)$.
 - The function opens up.

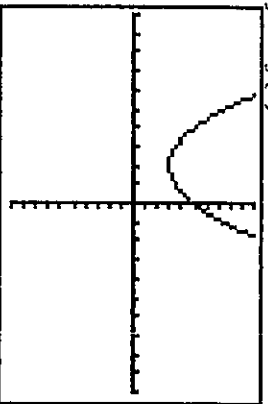
21. Which of the following statements is not true for a given quadratic equation?
- The y-coordinate of the vertex represents the minimum or maximum value.
 - The axis of symmetry is given by the x-coordinate of the vertex.
 - The x-coordinate of the vertex represents the minimum or maximum value.
 - The midpoint between the x-intercepts is the x-coordinate of the vertex.

22. Given $y = f(x)$ below,

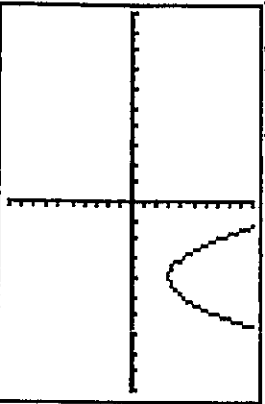


Which of the following graphs is correct?

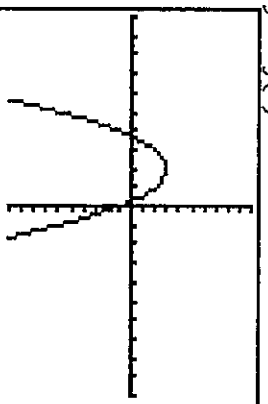
a. $y = 2f(x)$



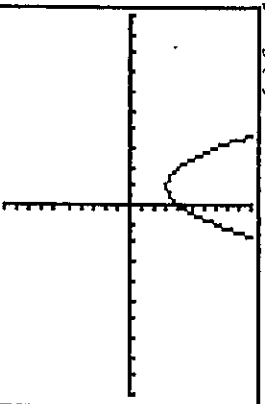
b. $y = f(x - 2)$



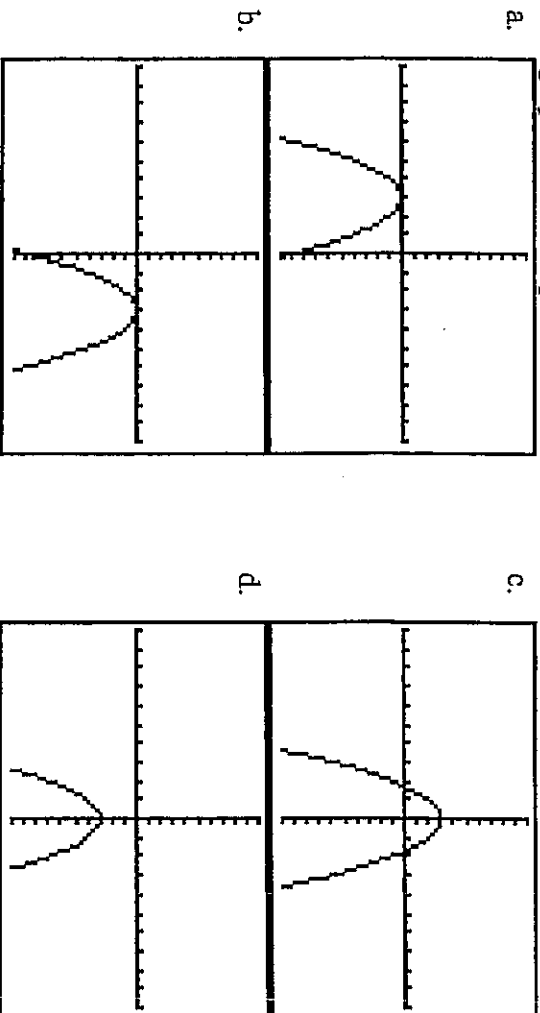
c. $y = -f(x)$



d. $y = f(x) - 3$



23. The graph that best represents $y = -(x + 3)^2$ is



24. Given that the graph of a quadratic function has exactly one zero, which of the following statements is true?

- The parabola opens upward and the y -value of the vertex is negative.
- The vertex is on the x -axis.
- The parabola opens downward and the vertex is below the x -axis.
- The parabola opens downward and the vertex is above the x -axis.

25. For which of the following functions are the roots clearly visible?

- $y = 5x^2 - 7x + 2$
- $y = -3(x + 1)(x - 2)$
- $y = 5(x - 7)^2 + 3$
- $y = 2x(x + 4) - 9$

26. State the value of the discriminant, D , and the number of roots for $7x^2 + 12x + 6 = 0$.

- $D = 312, n = 2$
- $D = 24, n = 2$
- $D = 312, n = 1$
- $D = -24, n = 0$

27. The expression $\frac{\text{max value} - \text{min value}}{2}$ calculates the

- period
- amplitude
- y -intercept
- range

28. What equation in the form $y = a \sin \theta$ best models the data in the chart below?

θ	0	-90	-180	-270	-360
y	0	-5	0	5	0

- $y = 5 \sin \theta$
- $y = -5 \sin \theta$
- $y = 10 \sin \theta$
- $y = -10 \sin \theta$

29. What equation in the form $y = \sin \theta + d$ best models the data in the chart below?

θ	0	90	180	270	360
y	2	3	2	1	2

- $y = \sin \theta + 1$
- $y = \sin \theta + 2$
- $y = \sin \theta + 3$
- $y = \sin \theta + 4$

30. The phase shift of the function $y = 5 \sin 4(\theta + 30^\circ)$ is

- 5
- 4
- 30°
- -30°

31. The horizontal line halfway between the maximum and minimum values of a periodic curve is called the

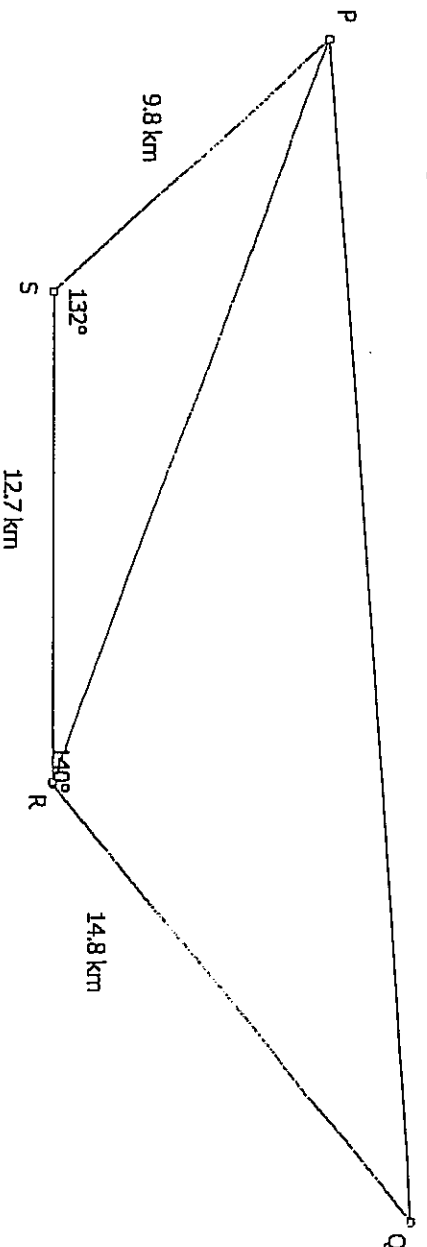
- line of best fit
- centroid
- axis of the curve
- Median

PART B: Full solutions are required. (The solutions will be written between the questions on the exam paper. In the interests of saving a tree, this shadow exam will not leave space for you to write a full solution.)

32. The Allans can afford to save \$1200 per month for the next 25 years. The rate is 3.7%/a compounded monthly. [5]
 a) How much money will the Allans have saved?
 b) How much money will be in their account at the end of the 25 years?
 c) How much interest will their money have earned over the whole 25 years?
33. The ordered pairs (1, 3), (3, 7), (-2, 5), and (-4, 6) belong to a function f . List the ordered pairs that belong to
 (a) $y = f(x - 3)$
 (b) $y = f(x) + 2$ [4]
34. Factor. a) $x^2 + 12x - 28$ b) $64 - 84x^2$ c) $8x^2 - 18x - 35$ [4]
35. Rearrange into factored form, then determine the vertex. $y = 2x^2 + 14x - 60$ [5]
36. For the function, $f(x) = -3x^2 + 15x - 10$, rearrange to the form $y = a(x - p)^2 + q$. State the vertex. [4]
37. Solve. Round to two decimals. $6x^2 - 29x + 20 = 0$. [3]

38. The population of triffids doubles every 5 years. If there are 26 triffids now, determine their population in 20 years. [3]

39. The length of PQ is



40. The vertex of a parabola is above the x -axis and the parabola opens up. How many zeros does the corresponding function have? [2]
41. Graph the functions a) $y = 3x^2 + 1$ b) $y = 3^x$ c) $y = \sin x$ d) $y = 4 \sin x$ [9]
42. The breathing of an athlete is steady while she works out according to the equation $v = 5 \sin(t - 6) + 3$, where v is the volume of air in a breath and t is the time in seconds. Find the amount of air breathed in 60 seconds. [3]