1R10 Half Yearly 2000

Question One (16 marks)

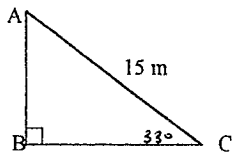
1. Calculate the area of a circle with radius 8 cm.
2. Calculate the circumference of the above circle.
3. Simplify $3\sqrt{2}\times 5\sqrt{2}$
4. If $\tan A = 1.234$ find A to the nearest minute.
5. Find the value of x if $y = 3x - 4$ and $y = -22$
6. Simplify $6a^2 + a - 3a^2 - 4a$
7. Simplify $(3a^2)^3$
8. A rhombus has diagonals x units and y units. What is its area?
9. Find the x intercept of the line whose equation is $2x - y = 10$
10. Complete the following; 'If two lines are parallel then their gradients are _____.'
11. Calculate the surface area of a cube with side 12 cm
12. Write down the pattern rule for the table below.

x	0	1	2	3
y	−2	2	6	10

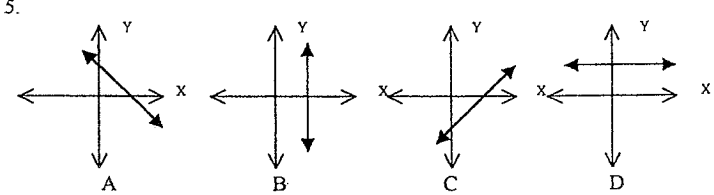
13. Factorise $15a^2 - 5a$
14. Find the co ordinates of the vertex of the parabola $y = x^2 + 1$
15. Find the simple interest rate which will allow \$5 500 to earn \$990 interest in 4 years.
16. Rationalise the denominator of $\frac{2}{\sqrt{3}}$

Question Two (16 marks)

1. Simplify $\frac{10x+8}{4}$
2. Expand and simplify $(y+7)(2y-1)$
3. Calculate the length of side AB in the triangle below correct to two decimal places.



4. Factorise; $x^2 - 2x + 1$
5.



Match each graph above with an equation below

$x = 4$

$y = 4$

$y = \frac{4}{x}$

$x + y = 4$

$x - y = 4$

6. Solve; $\frac{3x}{2} - \frac{2x}{5} = 12$
7. Fei borrowed \$16 000 at 12%pa simple interest for 5 years so that she could buy a second hand car. At the end of the 5 years both interest and loan had been repaid.
   a) How much interest was charged?
   b) How much was paid back altogether?
   c) If the loan was repaid in equal monthly payments over the five years, calculate the amount of each repayment
8. The population of a small country town is decreasing by 15% of its population every year. What would the population be in ten years time if it is now 2700?

Question Three (16 marks)

1. Simplify; $\sqrt{75}$

2. Find the gradient of the line whose equation is $2x-3y+4=0$

3. Banks often advertise interest rates as *daily rates*. Find an equivalent interest rate per annum for 0.06027% per day.

4. Given the equation of a circle is $x^2+y^2=9$ find;
   a) The co ordinates of its centre
   b) The radius

5. Given the points $P(-2, 8)$, $Q(4, 6)$ find ;
   a) The gradient of PQ
   b) The co ordinates of the midpoint of PQ
   c) The length of PQ

6 Given the parabola $y=6x-x^2$
   a) Find the x intercepts
   b) What is the equation of the axis of symmetry?
   c) What are the co ordinates of the vertex?
   d) Draw a neat sketch of the parabola

7. Jessica invested $15 000 for 4 years at a rate of 8.5% pa compound Interest (compounded yearly);
   a) To what amount did the investment grow in this time.
   b) How much interest was earned altogether.

Question Four (16 marks)

1. Find the simple interest earned on $2500 at 8%pa invested for ten months.

2 If $y=-x^2+c$ find c when $x=2, y=6$

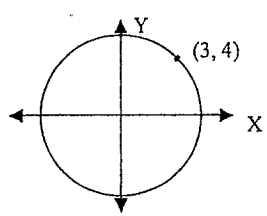
3.Solve the following pair of simultaneous equations;

$$\begin{cases} 8x-2y=6 \\ 4x+6y=22 \end{cases}$$

4. Factorise; $3a^2+7a-6$

5. Draw a neat sketch of each of the following showing relevant features;
   a) $y=2^x$
   b) $xy=-2$
   c) $y=-2x^2$

6. Find the equation of the circle below.



Question Five (16 marks)

1. On the same set of axes draw a neat sketch of $y = x^2$ and $y = 2x^2$

2. Solve $6 - 3x \leq -9$

3. Mei invested some money for one year. One half was invested at 12% pa, one third at 10% pa and the rest at 9% pa. What was the overall interest rate?

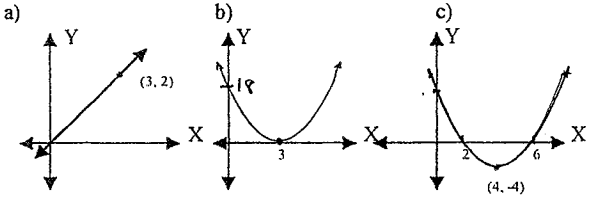
4. My grandmother invested $100 fifty years ago at a fixed rate compounded annually. The investment has now grown to $2 330.67. What rate of interest per annum is being paid?

5. After having depreciated at a rate of 9% pa , a motor vehicle is now worth $15 000. What was its value six years ago?

6. Change the subject of the formulae to y in $3y = ay + 4$

7. Find the equations of the following;

a) b) c)



8. Factorise $a^3 - a - a^2 + 1$

$\alpha\beta\chi\delta\varepsilon\phi\varphi\gamma\eta\iota\kappa\lambda\mu\nu o\pi\varpi\theta\vartheta\rho\sigma\varsigma\tau\upsilon\omega\xi\psi\zeta$

Answers

Q1 (1 mark each)

1) $A = \pi r^2$
$= 64\pi$ cm
$= 201.1$ (1 dp)

2) $C = 2\pi r$
$= 16\pi$ cm
$= 50.3$ (to 1 d.p)

3) 30

4) ~~Bearings~~
$50° 59'$

5) $-2x = 3x - 4$
$-18 = 3x$
$x = -6$

6) $6a^2 + a - 3a^2 - 4a$
$= 3a^2 - 3a$

7) $(3a^2)^3 = 27a^6$

8) $A = \frac{1}{2}xy$

9) on x axis $y = 0$
$2x = 10$
$x = 5$

10) equal

11) 6×144 cm^2 $= 864$ cm^2

12) $y = 4x - 2$

13) $5a(3a - 1)$

14) $(0, 1)$

Yr 10 $\frac{1}{2}$ YRLY 2000

15. 4.5%

16. $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

Q2

1) $\frac{2(5x+4)}{4} = \frac{5x+4}{2}$

2) $(y+7)(2y-1) = 2y^2 - y + 14y - 7$
$= 2y^2 + 13y - 7$

3) $\frac{AB}{15} = \sin 33°$

$AB = 15 \sin 33°$
$= 8.17$ (correct to 2dp)

4) $x^2 - 2x + 1 = (x-1)^2$

5) A; $x + y = 4$
B, $x = 4$
C: $x - y = 4$
D: $y = 4$

5) $\frac{3x}{2} - \frac{2x}{5} = 12$

multiply throughout by 10
$15x - 4x = 120 \Rightarrow 11x = 120$
$x = 10\frac{10}{11}$

6) S.I. $= 12\% \times \$16000 \times 5$ yrs
a) $= \$9600$

b) $\$16000 + \$9600$
$= \$25600$

c) $60 \overline{)\$25600}$ $\$426.67$

7) $P = 2700(1 - 0.15)^{10}$
$\doteq 531$ people

Q3

1) $\sqrt{25} = 5\sqrt{3}$

2) $2x - 3y + 4 = 0$
$3y = 2x + 4$
$y = \frac{2}{3}x + \frac{4}{3}$
$m = \frac{2}{3}$

3) 0.06027×365
$\doteq 22\%$

4) centre $(0, 0)$
radius 3

3) $m = \frac{8-6}{-2-4}$
$= \frac{2}{-6} = -\frac{1}{3}$

b) $-\frac{-2+4}{2}$, $\frac{8+6}{2}$

$(1, 7)$

c) $d = \sqrt{(-2-4)^2 + (8-6)^2}$
$= \sqrt{40}$
$= 2\sqrt{10}$

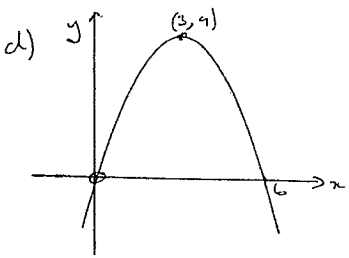
4) $y = 6x - x^2$

a) on the x axis $y = 0$
$0 = 6x - x^2$
$0 = x(6 - x)$
$x = 0$, $x = 6$

b) $x = -\frac{b}{2a}$ or $\frac{0+6}{2} = 3$

c) when $x = 3$
$y = 6(3) - 3^2$
$= 9$
ie $(3, 9)$

d)



5. a) $A = 15000(1.085)^4$
$= \$20787.88$

b) $\$20787.88 - \$15000$
$= \$5787.88$

Q4

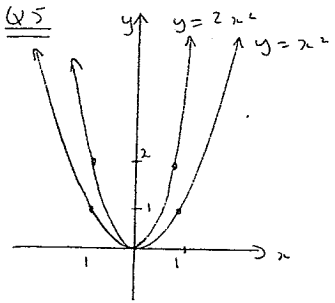
1) S.I. $= 8\% \times 2500 \times \frac{10}{12}$
$= \$166.67$

2) $y = -x^2 + c$
$6 = -(2)^2 + c$
$6 = -4 + c$
$c = 10$

3) $8x - 2y = 6$ (1)
$4x + 6y = 22$ (2)
(1) $\times 3$ $24x - 6y = 18$ (3)
(2) + (3) $28x = 40$
$x = 1\frac{12}{28}$
$= 1\frac{3}{7}$
$8(\frac{10}{7}) - 2y = 6$
$-2y = 6 - \frac{80}{7}$

Q5

1)



2) $6 - 3x \leq -9$

$-3x \leq -15$

$x \geq 5$

3) $\frac{1}{2}$ at 12%, $\frac{1}{3}$ at 10%, $\frac{1}{6}$ at 9%

$= 10\frac{5}{6}\%$

4) $A = P\left(1 + \frac{r}{100}\right)^n$

$2330.67 = 100\left(1 + \frac{r}{100}\right)^{50}$

$23.3067 = \left(1 + \frac{r}{100}\right)^{50}$

$\sqrt[50]{23.3067} = 1 + \frac{r}{100}$

$\left(\sqrt[50]{23.3067} - 1\right) = \frac{r}{100}$

$r = \left(\sqrt[50]{23.3067} - 1\right) \times 100$

$r = 6.5\%$

5. $15\,000 = P\left(1 - \frac{9}{100}\right)^6$

$P = \frac{15\,000}{(0.91)^6}$

$= \$26414.53$

6. $3y = ay + 4$

$3y - ay = 4$

$y(3-a) = 4$

$y = \frac{4}{3-a}$

7. a) $y = mx$, $m = \frac{2}{3}$

$y = \frac{2}{3}x$

b) $y = a(x-3)^2$

when $x = 0$, $y = 18$

$\therefore a = 2$

$y = 2(x-3)^2$

c) $y = a(x-2)(x-6)$

when $x = 4$, $y = -4$

$-4 = a(4-2)(4-6)$

$-4 = -4a$

$a = 1$

$\therefore y = (x-2)(x-6)$

8) $a^3 - a - a^2 + 1$

$= a^3 - a^2 - a + 1$

$= a^2(a-1) - 1(a-1)$

$= (a^2 - 1)(a-1)$

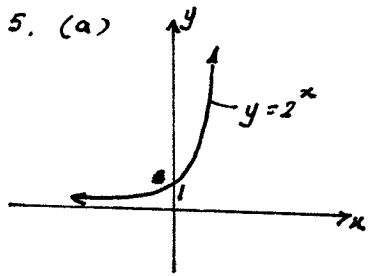
$= (a+1)(a-1)(a-1)$

$= (a+1)(a-1)^2$

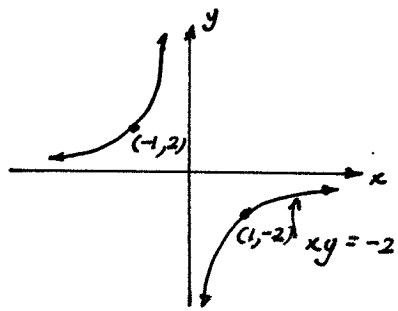
Q4

4. $(3a-2)(a+3)$

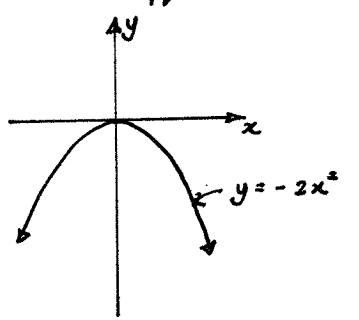
5. (a)



(b)



(c)



6. $x^2 + y^2 = 25$