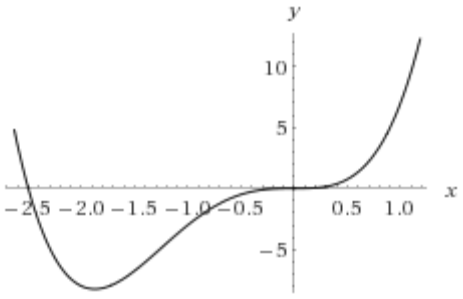
Mathematics (2Unit) Practice Questions ANSWER SHEET Year 11 & 12

Calculus (Solutions)

1. $\frac{dy}{dx} = 2x + 5$
2. $\frac{dy}{dx} = \frac{1+(x-2)\sin(x)}{\cos^2 x}$
3. $\frac{dy}{dx} = x^2 e^{2x}(3 + 2x)$
4. $\frac{1}{12}(2x + 4)^6 + c$
5. $\frac{1}{3}\tan(3x) + x + c$
6. $\frac{-3}{2(2X-5)} + c$
7. $\frac{1}{2}\ln(x^2 + 4) + c$
8. 8
9.
   I. $\frac{dy}{dx} = 3x^2(2x + 5) + 2x^3$
   II. x=0 Horizontal point of inflexion, x=-15/8 minimum turning point
   III. 

   IV. $x > 0, x < \frac{-5}{4}$
10.
   I. $9\frac{1}{3}$
   II. 12

11. $(4\pi + 3)units$

12.

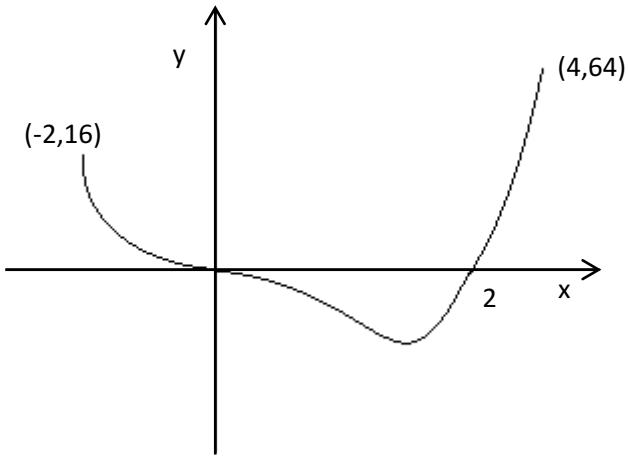
I. *Proof*

II. $r = 3\sqrt{\frac{10}{\pi}}$

13. Consider the curve given by $y = \frac{1}{2}x^4 - x^3$

I. (0,0) horizontal point of inflexion, (3/2, -27/32) minimum turning point

II. (0,0) (1,-1/2)



III.

IV. $0 < x < 1$

14. *proof*

15.

I. x_A=1, x_B=3

II. $(4 - 3\ln 1)units^2$

Sequence and Series (Solutions)

1. 3 115

2. $74, 302.02

3. .

   I. |r|<1 or -1<r<1

   II. $-\frac{1}{w} - \frac{1}{w^2} - \frac{1}{w^3} - \cdots$

4.

   I. 80

   II. 665

   III. 38

5.

   I. $-\frac{1}{2} < x < \frac{1}{2}$

   II. 0.485

6.

   I. 24 576

   II. 20th day

   III. $82

7.

   I. 738mm

   II. 7

8.

   I. $A_2 = 220\,000\left(1 + \frac{0.06}{k}\right)^2 - \left(1 + \frac{0.06}{k}\right)F - F$

   II. *proof*

   III. $3635.76

   IV. $574.40

9.

I. .$A_n = 400000 \times 1.0025^n - \frac{M(1.0025^n - 1)}{0.0025}$

II. $2,218.39

10. $1 302.61

Probability (Solutions)

11. 0.33

12.

I. 1/1359 or 0.07358%

II. 3/4076 or 0.07360%

III. 1/1 846 428

13. 0.25

14.

I. 1/6

II. 1/720

15.

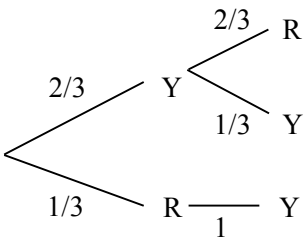
I. 0.2

II. 0.4

III. 0.5

16.

I.



II. 2/9

III. 5/9

17.

I. 1/3

II. 1/55

III. 28/55

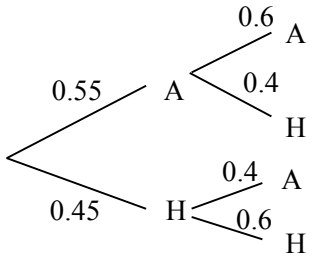
18.

I. 1/20

II. 57/8000

19.

I.



II. 0.4

20.

I. 4/13

II. 43/91

III. 48/91

Geometry (Solutions)

21.

I. $m_1 = 2/3$ $m_2 = -3/2$

II. $m_1.m_2 = -1$

III. OA $=\sqrt{13}=$AB

IV. D (2 ½ , - ½)

V. C (2,-3)

VI. square

22.

I. $\angle AOB = 60^o \ (six\ equal\ angles\ at\ centre)$

$and\ OA = OB\ (radii)$

$\therefore \angle OAB = \angle OBA\ (angles\ opp. equal\ sides)$

$\therefore \angle OAB = (180 - 60) \div 2 (angle\ sum\ of\ triangle)$

$\therefore \angle OBA = 60^o$

$\therefore \Delta OAB\ is\ equilateral$

II. $\sqrt{3} units^2$

23.

I. $11\frac{1}{3}$

II. 8 units ^{2}

24.

I. *proof*

II. $C(0,4\frac{2}{5})$

III. $\frac{12\sqrt{26}}{13}$

IV. $\frac{54\sqrt{26}}{65}$

25. *proof*

26.

I. *proof*

II. *Proof*

III. $\frac{3\sqrt{26}}{26}$

IV. 3 units^2

V. $\frac{3\sqrt{17}}{17}$

27.

I. *proof*

II. A (-7,4)

III. BC $2\sqrt{10}$

IV. $\frac{5\sqrt{2}}{2}$

V. $35\sqrt{10}$

28. 12.6

29.

I. *proof*

II. Alternate angles

III. Parallelogram

30. 26°

31. *proof*

Rates of Change (Solutions)

32.

I. A=10.46

II. 1 day

33.

I. N_o= 500, k=0.182 (to 3 decimal places)

II. 5 years, :. 2018

34.

I. 0.028

II. 18 years

35.

I. $1.74x10^{11}$

II. 1.68 lumen

III. ΔL=3.5

36.

I. 654

II. 12.01

III. 6 years

Motion (Soluitions)

37.

I. V=20

II. t=5,10

III. t=3,7

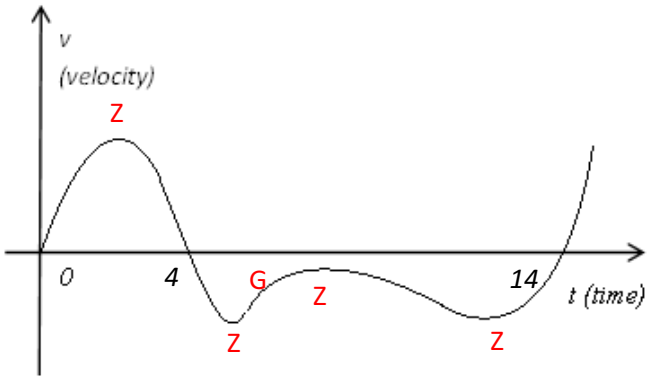
38.

I. x=4

II. $v = -3 + \frac{9}{t+1}, a = \frac{-9}{(t+1)^2}$

III. t=2

39.



I.

II.

III. Between *t*=0 and *t*=4, the particle is moving away from its initial position because its velocity is positive.

Between, *t=4 and t*=14, the particle is moving towards its initial position since its velocity is negative.

The particle is hence, furthest from the initial position at *t=4.*

40.

I. $x = \frac{-1}{2}t^4 + 6t^3 - 4t^2 + 3$

II. Stationary points

III. 1.8 kg

Miscellaneous Algebra (Solutions)

41. y= ½, x= 3 ½

42. (x-3)(x+10)

43. $x < -2$

44. $\frac{\sqrt{10}-2}{4}$

45. $x = -\frac{4}{5}$