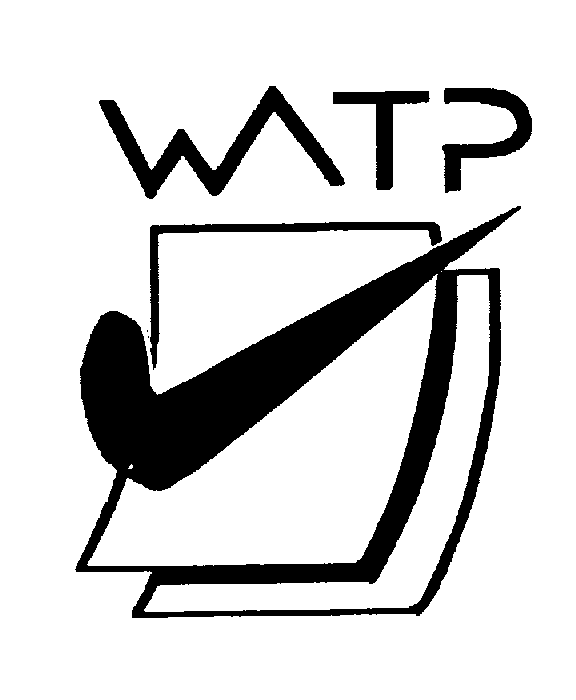
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**SEMESTER TWO**

**MATHEMATICS**

**METHODS**

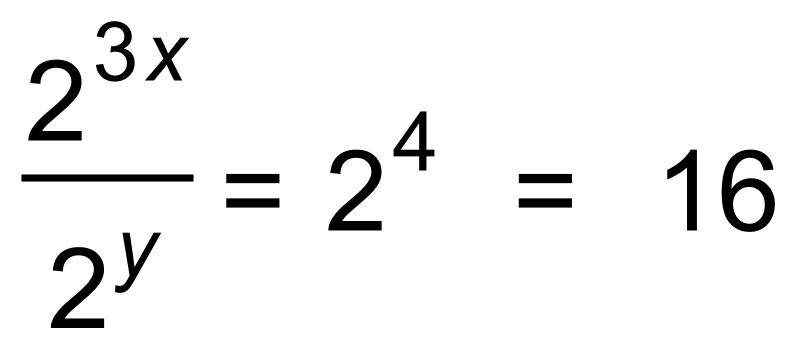
**UNITS 1 & 2**

**2018**

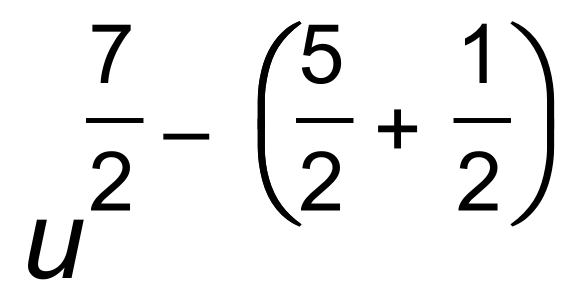
**SOLUTIONS**

***Calculator−free Solutions***

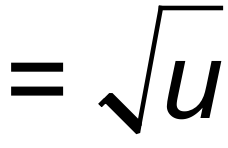
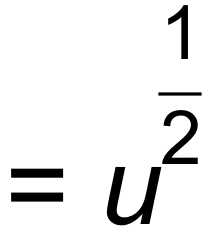
1. (a) ✔✔



(b) ✔



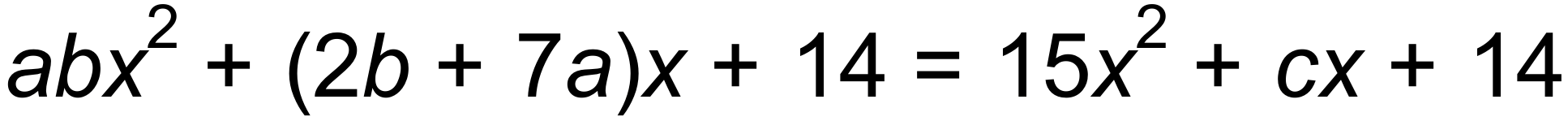
✔[4]



2.



✔



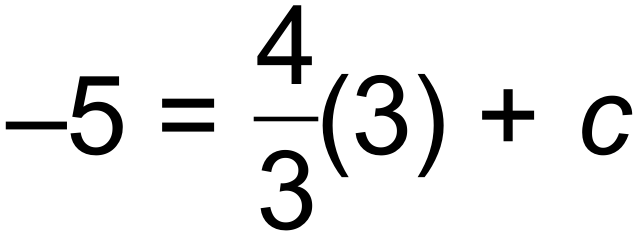
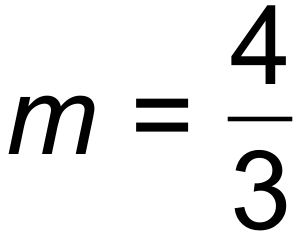
✔



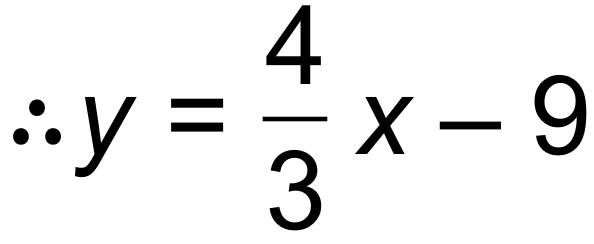
✔✔ [4]



3. (a) ✔



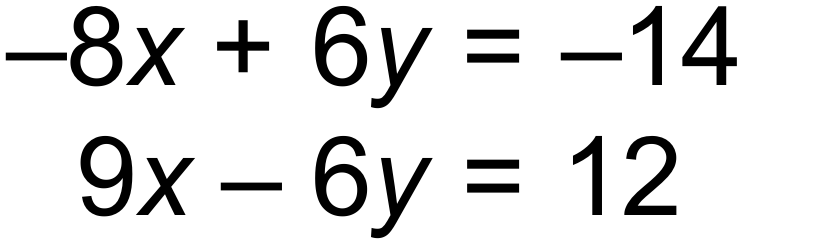
✔



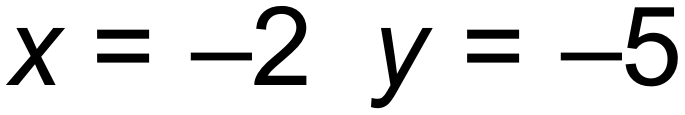
✔



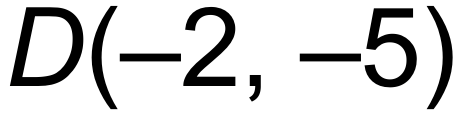
(b)



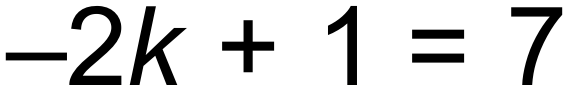
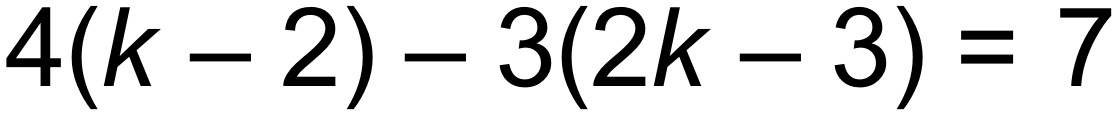
✔



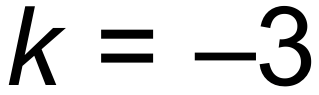
✔



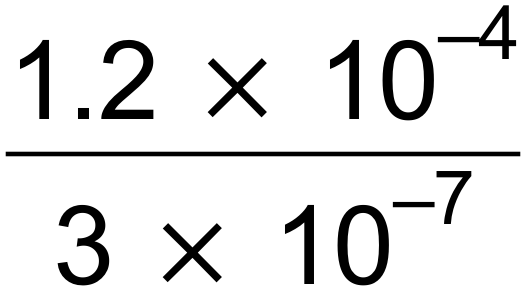
(c) ✔



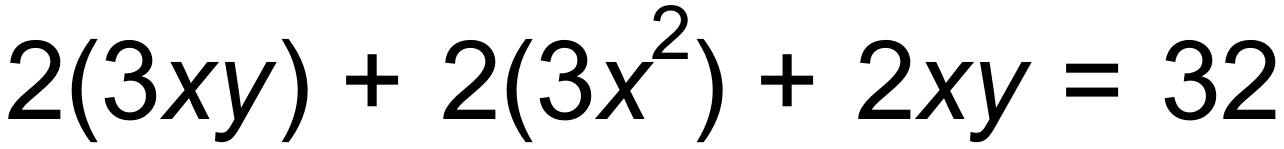
✔ [7]



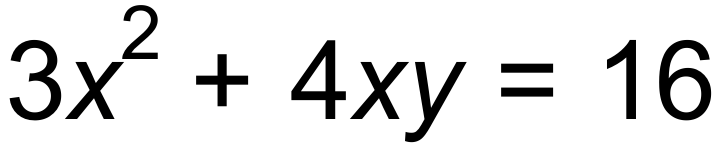
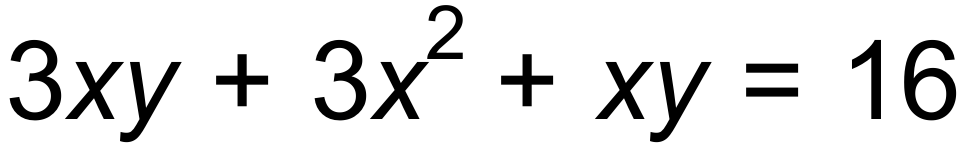
4. = 400 ✔✔[2]



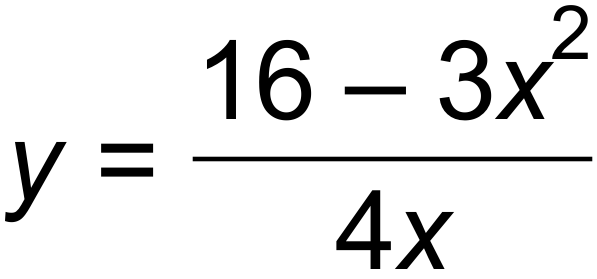
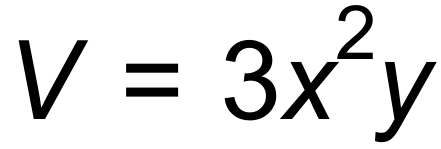
5. (a) ✔



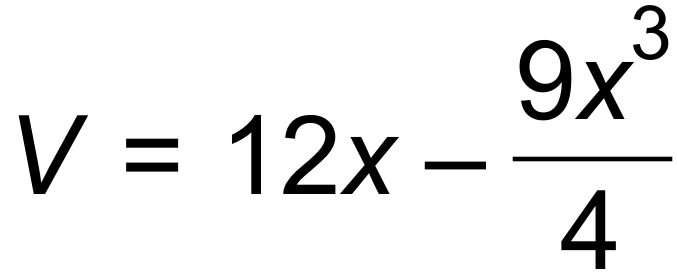
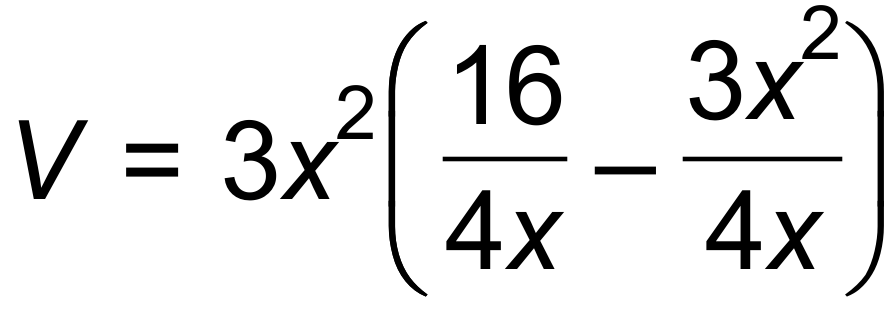
✔



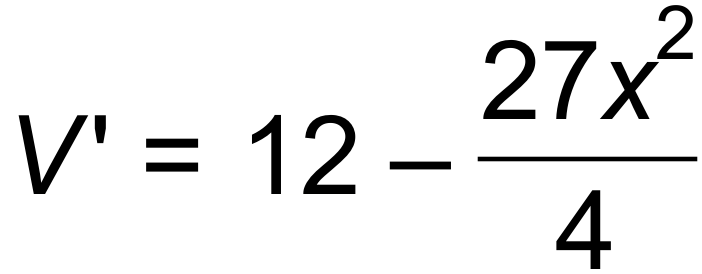
(b) and ✔



✔



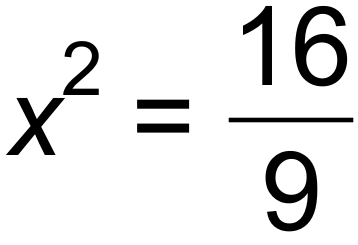
(c)



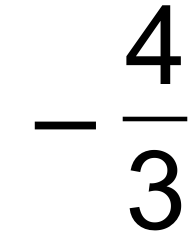
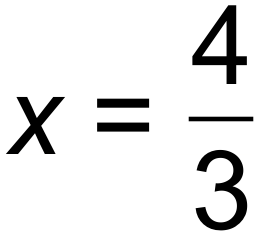
✔



✔



(discard ) ✔

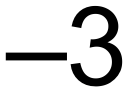


(d)

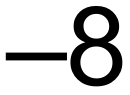
| *V(x)* | ↑ |  | ↓ |
| --- | --- | --- | --- |
| *V’(x)* | + | 0 |  |

*V* has a maximum value ✔✔ [9]

6. (a) Tn+1 = Tn +10 T1 = ✔✔

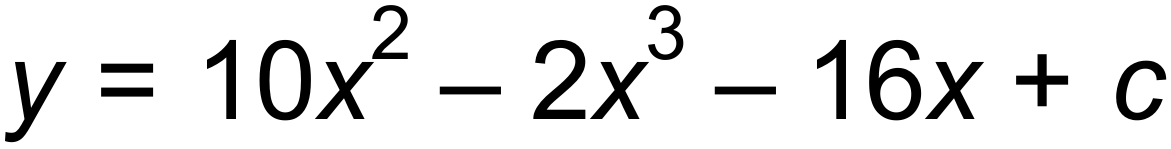


(b) T2 = ✔

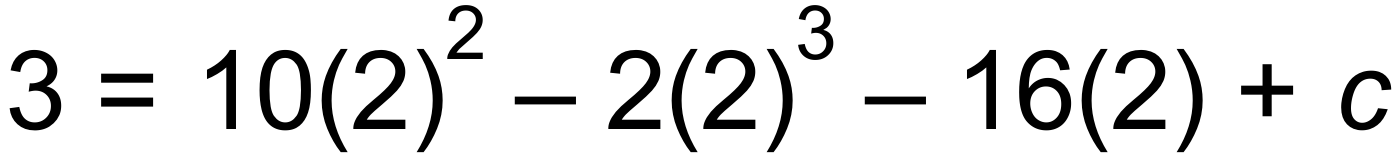


T3 = −32 ✔[4]

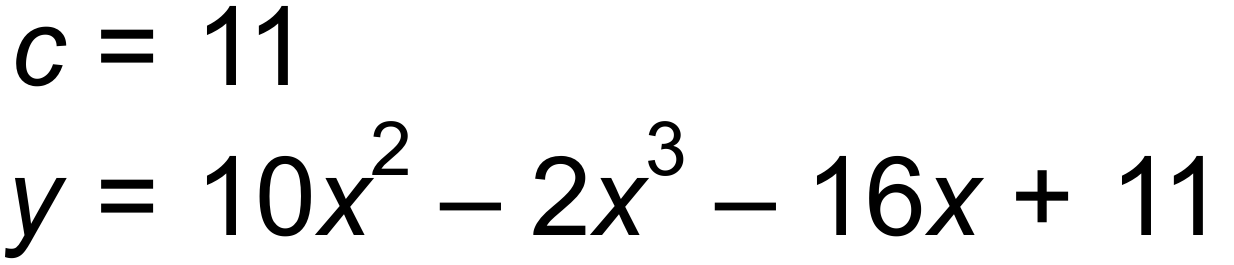
7. (a) ✔



✔



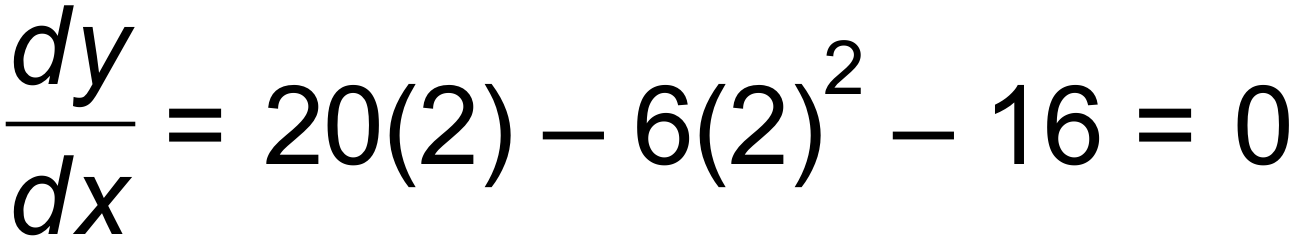
✔



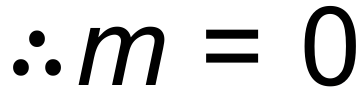
(b) Gradient of xaxis = 0



✔



Tangent is horizontal and parallel to the xaxis. ✔ [5]

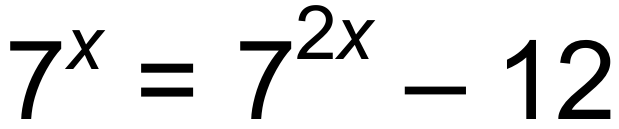


8. (a) Vertical translation 12 units down ✔

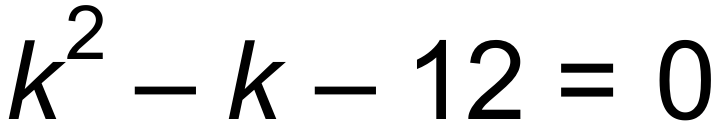
Horizontal dilation by factor . ✔



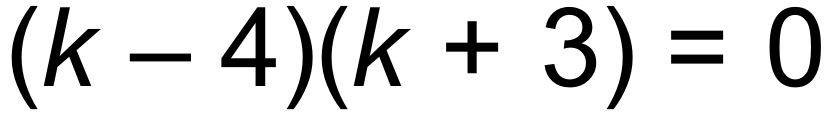
(b)



Let be *k*. ✔



✔

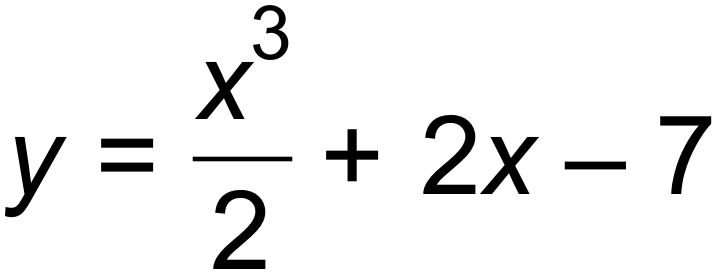


✔

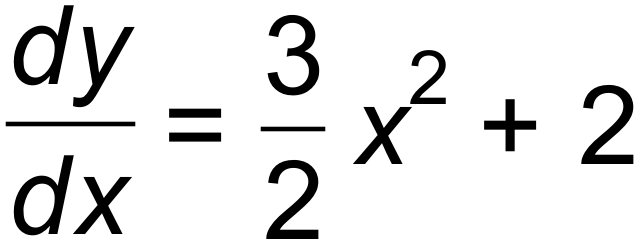


One solution, therefore intersects at only one point. [5]

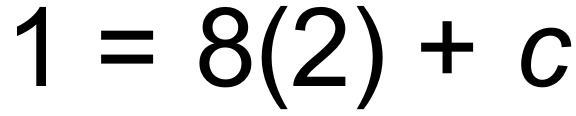
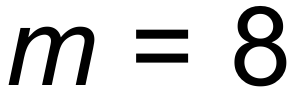
9. (a) ✔



✔



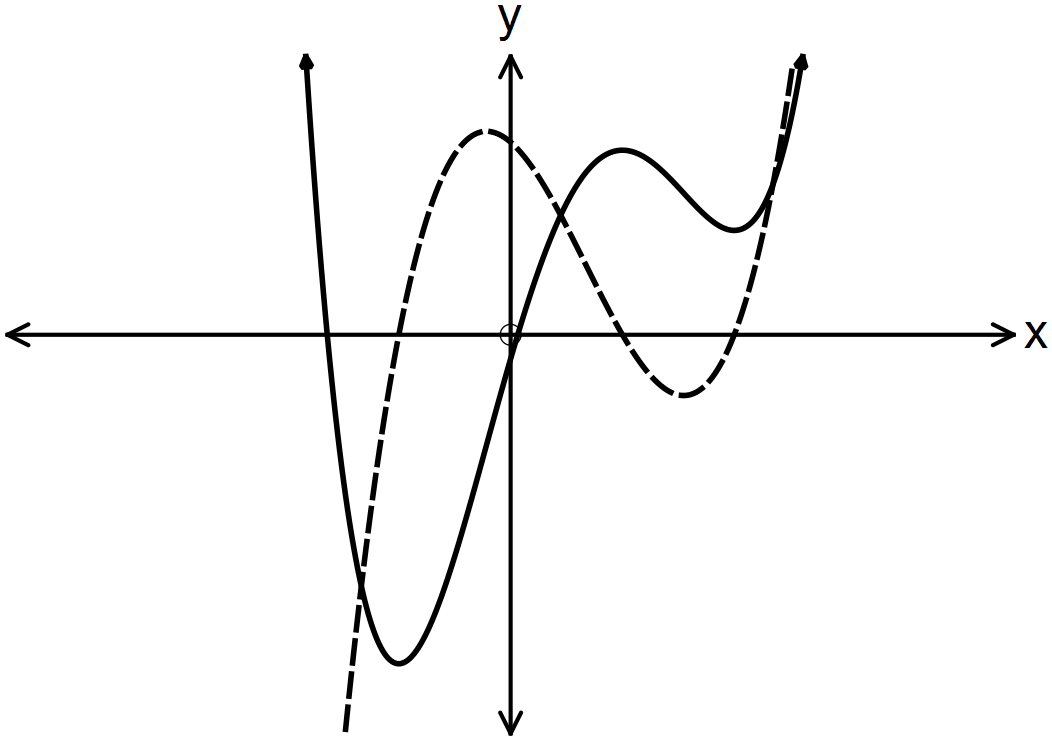
✔



✔



(b)



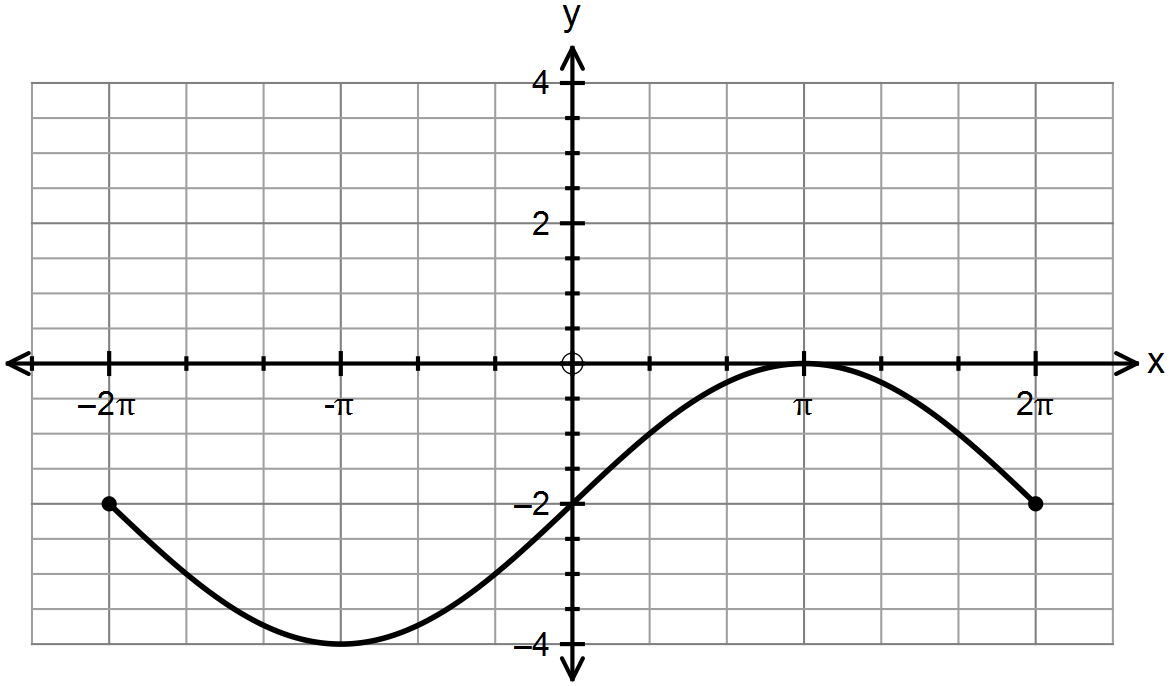
✔✔[6]

10. (a) Period ✔



Amplitude = 2 ✔

(b)



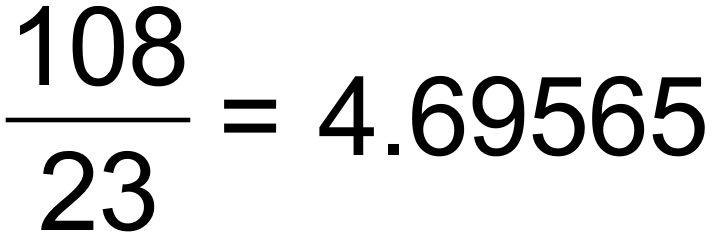
✔✔✔[5]

***Calculator−assumed Solutions***

11. (a) The number of phones she is given to repair for the week. ✔

(b) She fixes 23 per day, for 4 days 23 x 4 = 92 phones ✔

(c) days ✔



hours

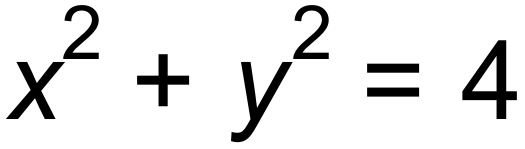


5 hours and 34 minutes ✔

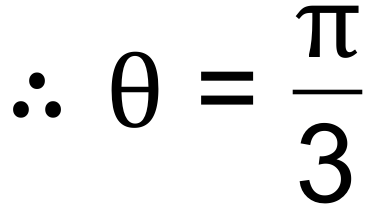
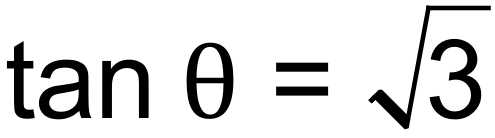
(d) T1 =155 T2 = 128 T3 = 99 T4 =68

Tn+1 = Tn – (25 +2n) T0 = 180 ✔✔ [6]

12. (a) ✔

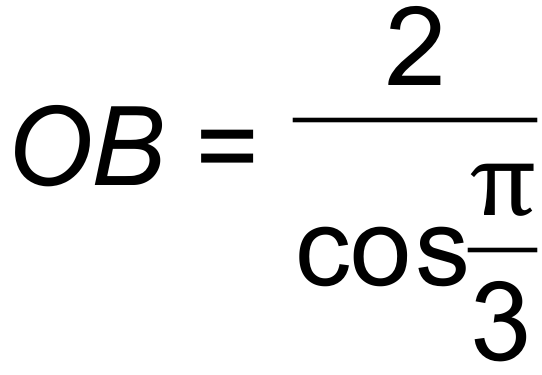


(b) radians ✔

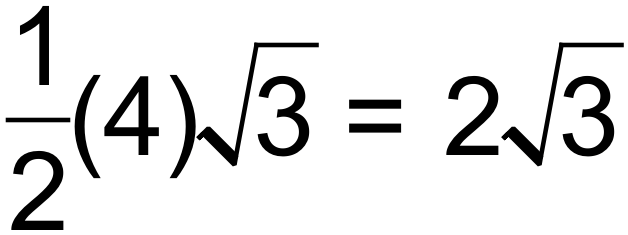


radius = 2 units ✔

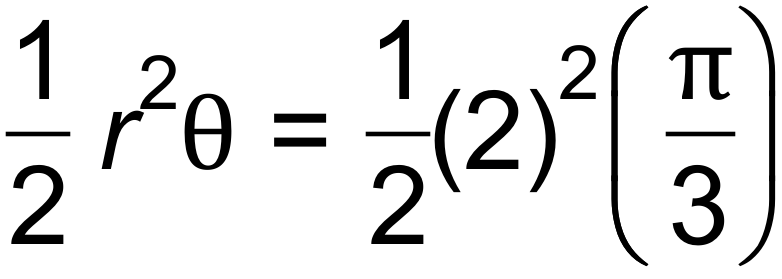
(c) = 4



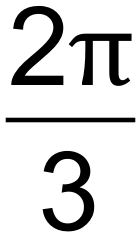
Therefore area of ΔAOB = units2 ✔



Area of sector =

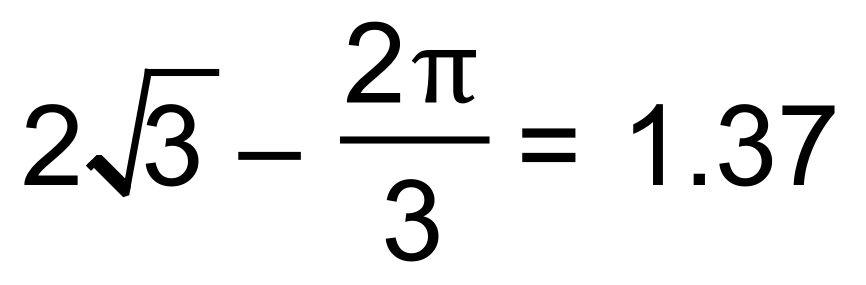


= units2 ✔



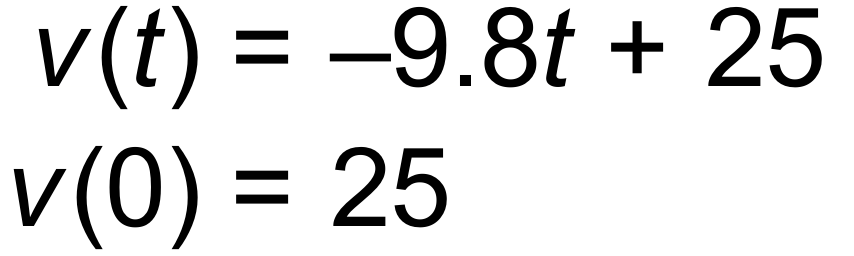
Area of shaded part = triangle – sector

= units2 (3 sig fig) ✔[6]

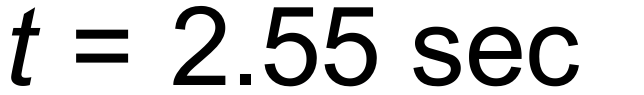


13. (a) 5.1 seconds ✔

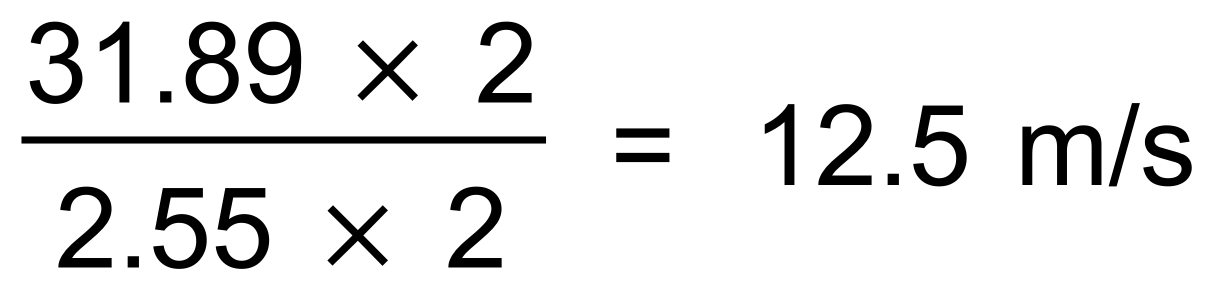
(b) ✔✔



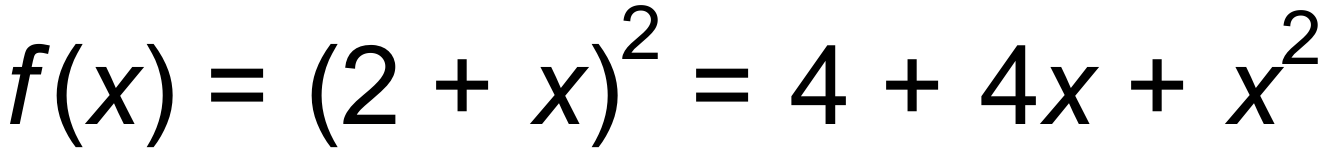
(c) Maximum height is 31.89 m when



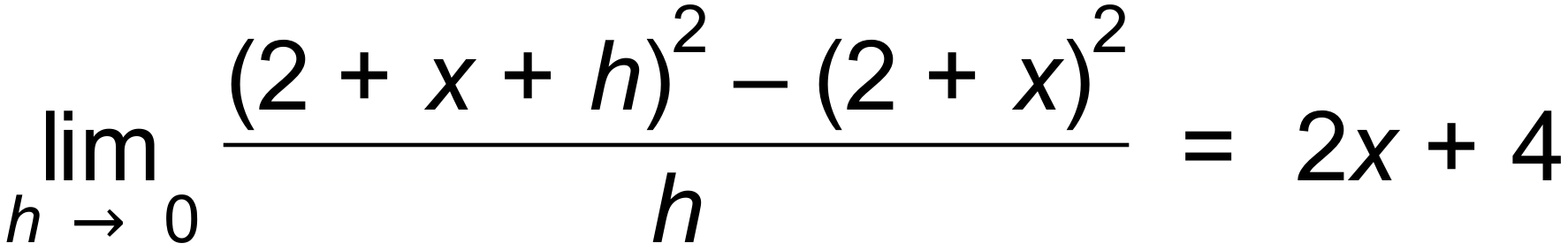
✔✔ [5]



14. (a) ✔



✔

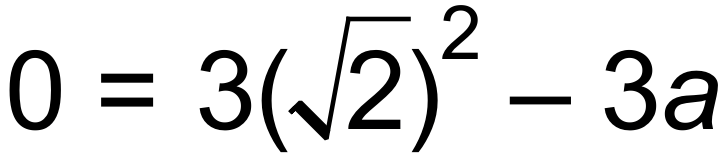
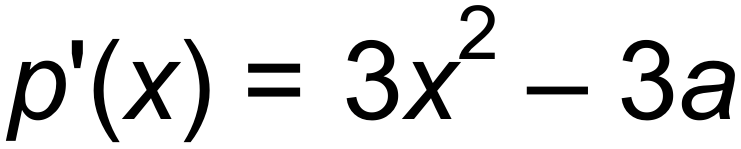


(b) (i) ✔

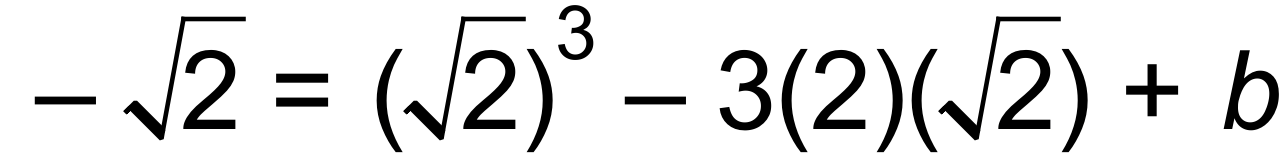


(ii) 18 ✔

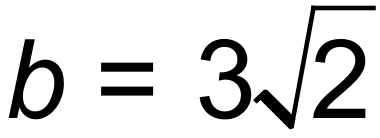
(c) ✔



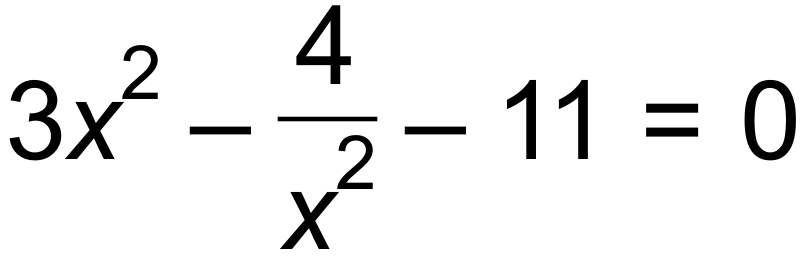
✔



✔[7]



15. (a)



✔✔

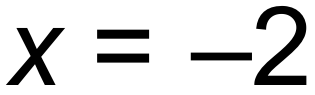


|  |  |  |  | 2 |  |
| --- | --- | --- | --- | --- | --- |
|  | + | 0 |  | 0 | + |
| *y* | ↑ | - | ↓ | - | ↑ |

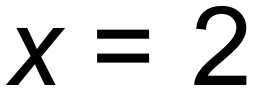
(b)

✔✔

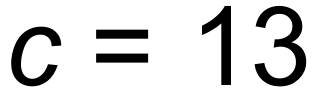
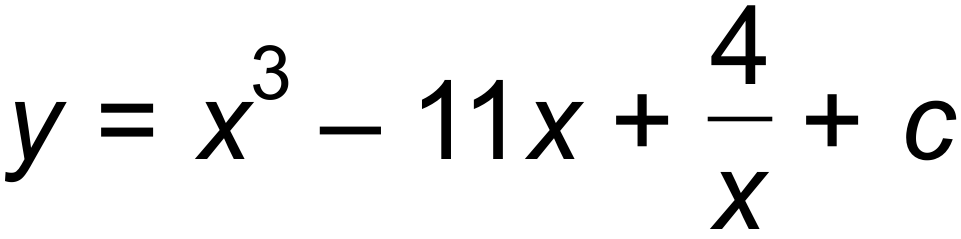
Maximum



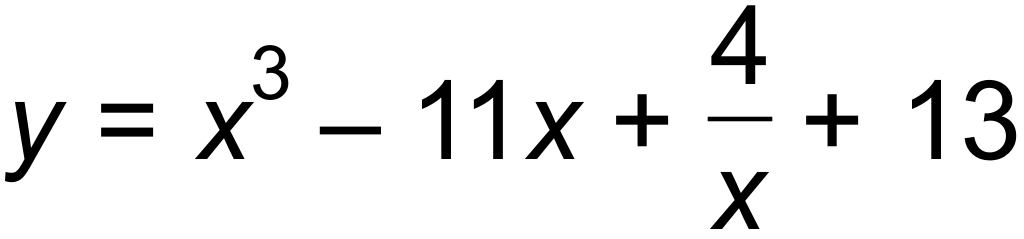
Minimum ✔



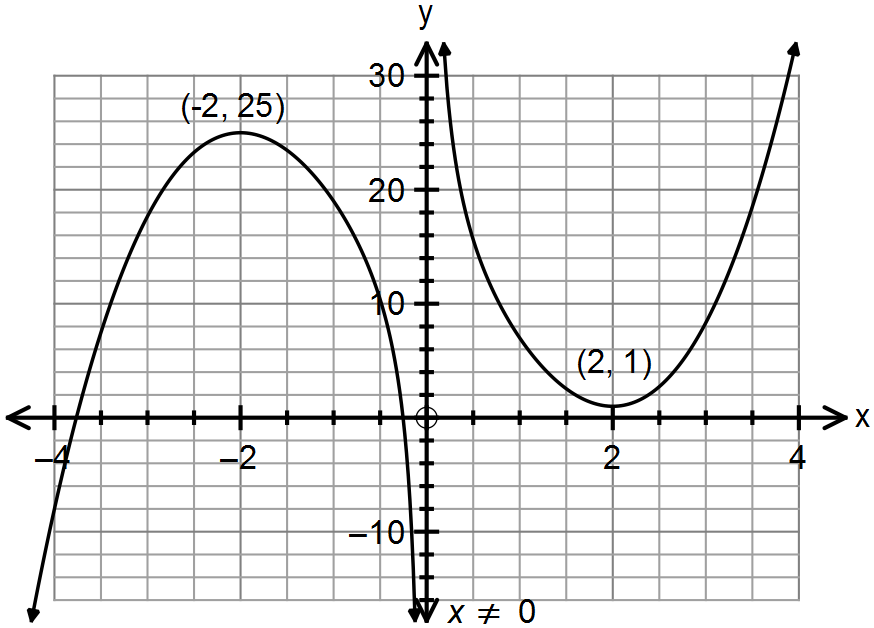
(c) ✔



✔



(d)

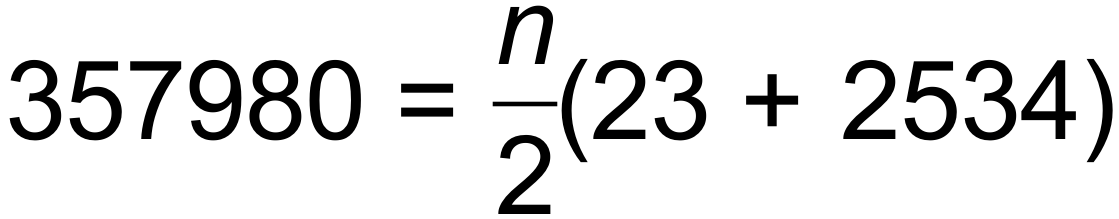


✔✔✔[10]

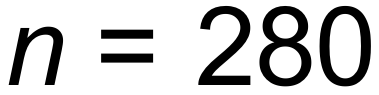
16. (a) (i) T100 = 23 +(99)(9) ✔

= 914 ✔

(ii) ✔



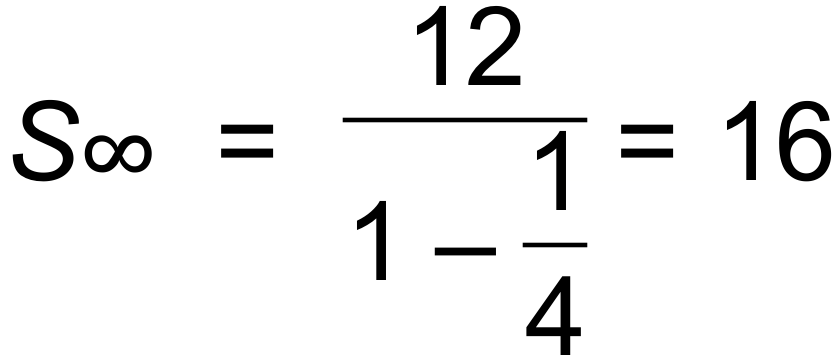
✔



(b) (i) Tn+1 = Tn T1 = 12 ✔✔



(ii) ✔✔ [8]



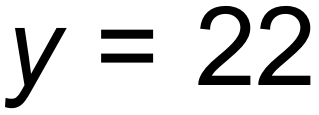
17. (a) 92°C (initial temp of tea) ✔

22°C (room temp) ✔

(b) After 4.12 mins and before 7.45 mins ✔✔



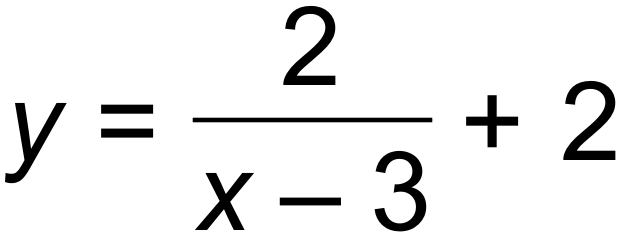
(c) Horizontal asymptote ✔



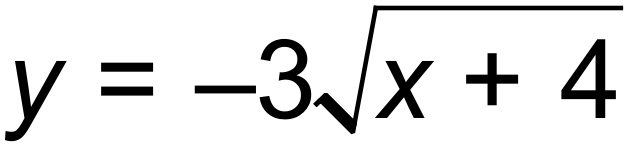
The tea will cool at a decreasing rate as it approaches room

temperature which is 22°. ✔ [6]

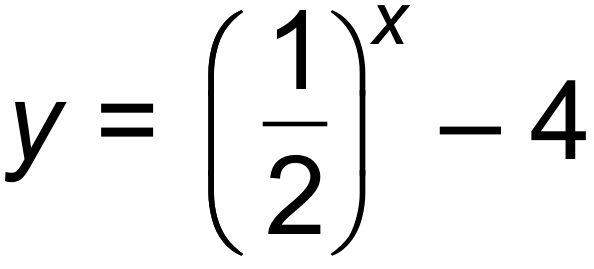
18. (a) ✔✔



(b) ✔✔



(c) ✔✔ [6]



19. (a) 0.2 ✔

(b) 0.5 ✔

(c) 0.3 ✔

(d) Pr(X Y) = Pr(X) x Pr(Y) if independent



Pr(X Y) = Pr(X) + P(Y) - Pr(X Y) ✔



Pr(X) + Pr(Y) - Pr(X Y) = Pr(X) x Pr(Y) ✔



Let Pr(Y) = k

0.5+ k - 0.8 = 0.5k

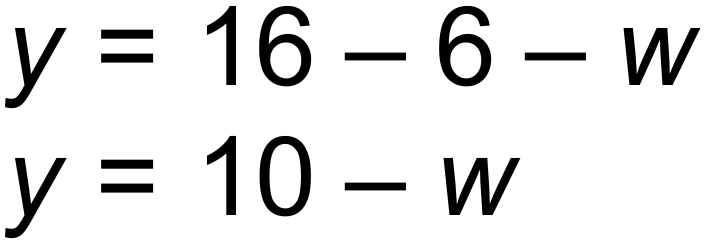
k = 0.6 = Pr (Y) ✔ [6]

20. (a) 1, 3, 7, 15,…

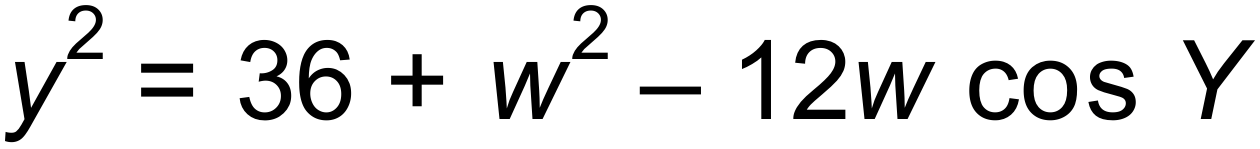
Tn+1 = Tn + 2n T1 = 1 ✔✔

(b) 20 sets ✔[3]

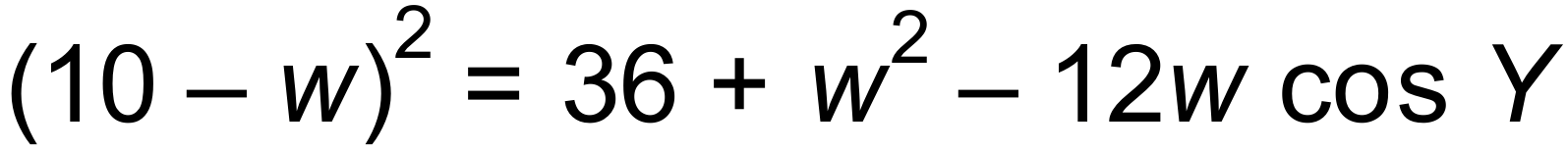
21. (a) (i) ✔



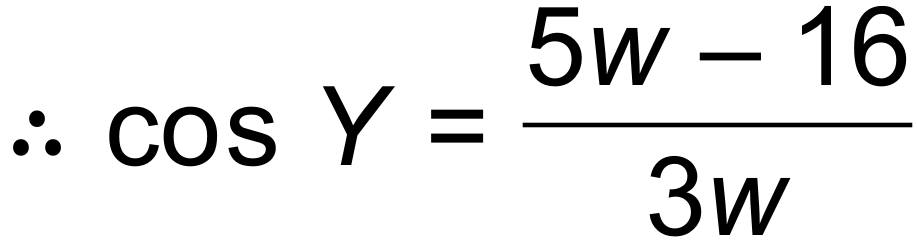
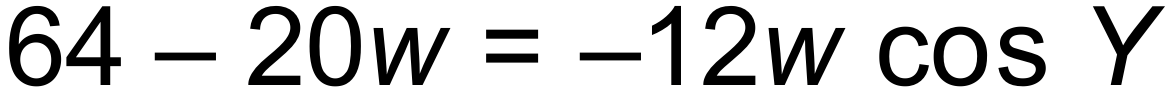
(ii) ✔



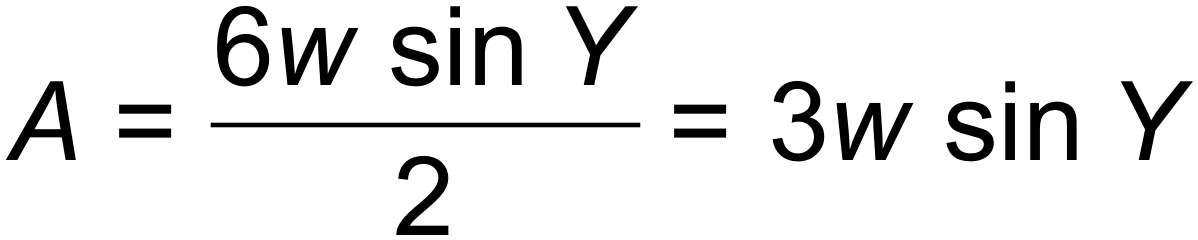
(iii) ✔



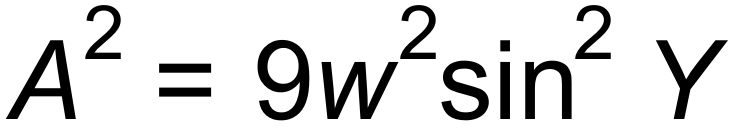
✔



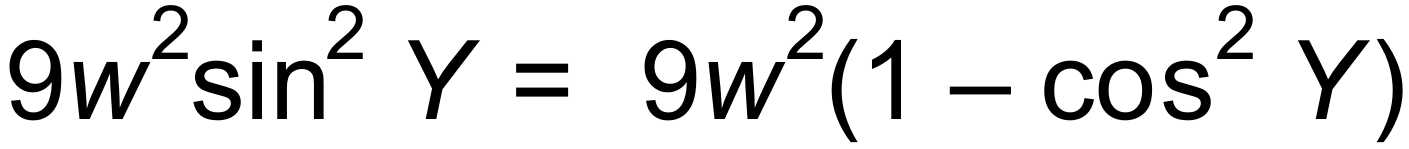
(b) (i) ✔



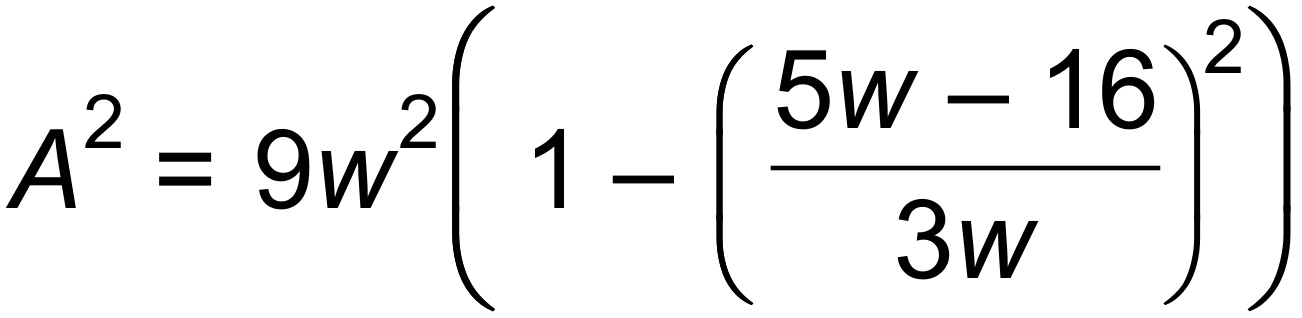
✔



(ii) ✔



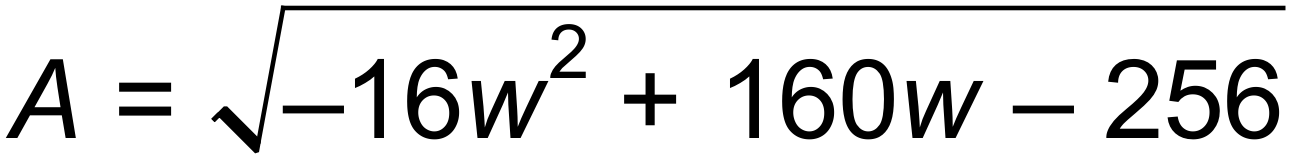
✔



✔



(c) (i)

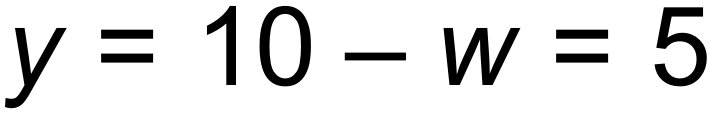


✔



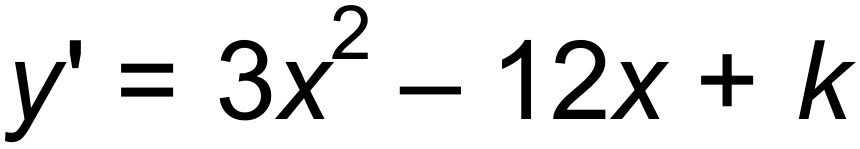
Maximum area = 12 units2 ✔

(ii)

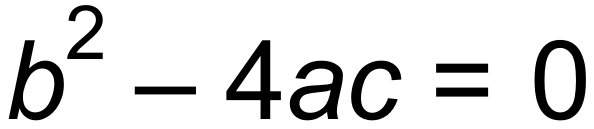


The triangle is isosceles. ✔ [12]

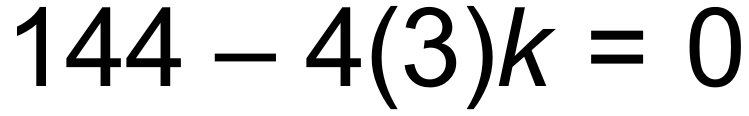
22. ✔



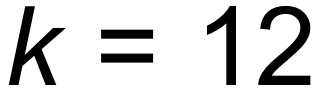
for one solution



✔



✔ [3]



23. (a) W = W0 (1.085)t

R = R0 (0.95)t

10W0 = R0

W0 (1.085)t = 10 x W0 (0.95)t ✔

(1.085)t = 10(0.95)t

years ✔

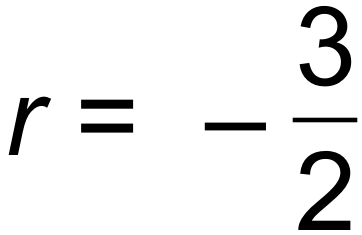


After 18 years there will be more wallabies. ✔

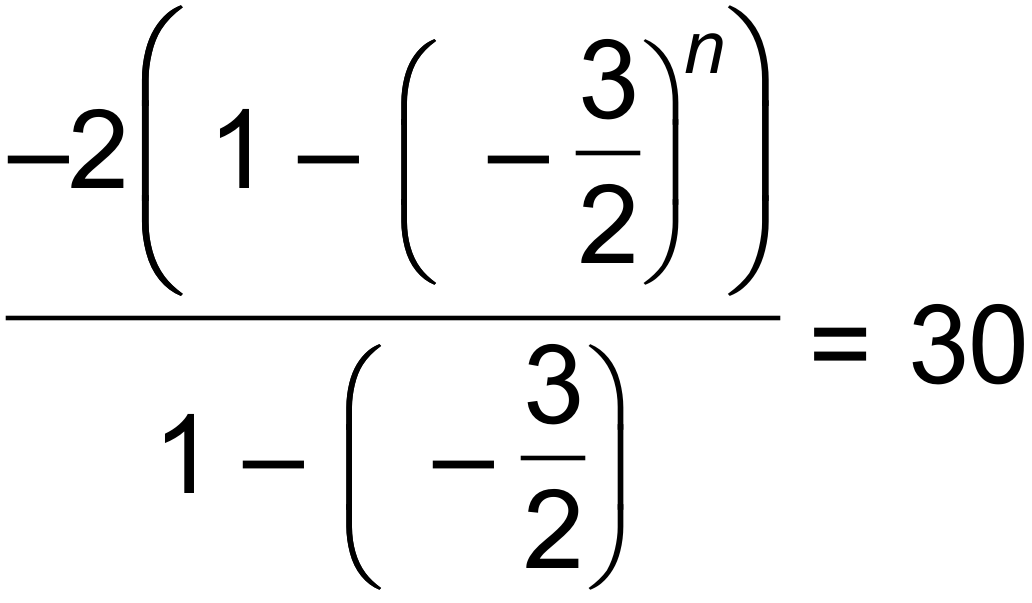
(b) Wn+1 = 1.085 Wn W0 = 655 ✔

W5 = 985 ✔ [5]

24. (a) ✔



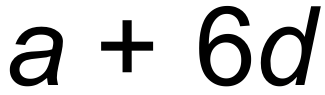
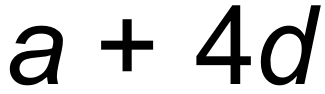
✔



✔



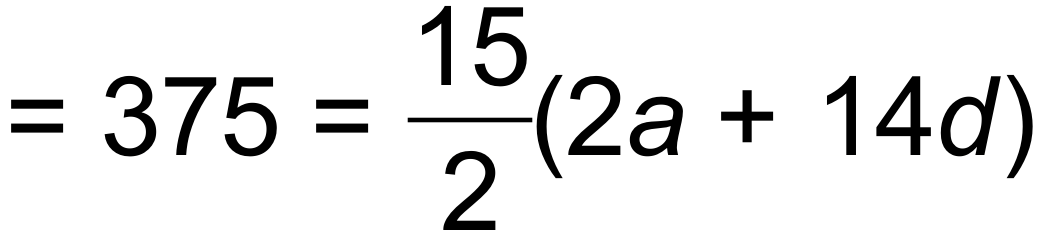
(b) T5 = and T7 =



(eq 1) ✔



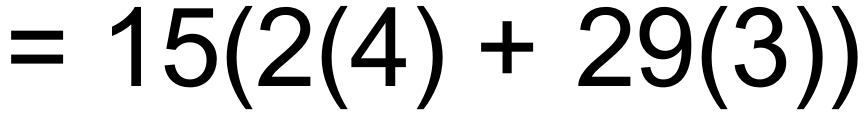
S15 (eq 2) ✔



✔



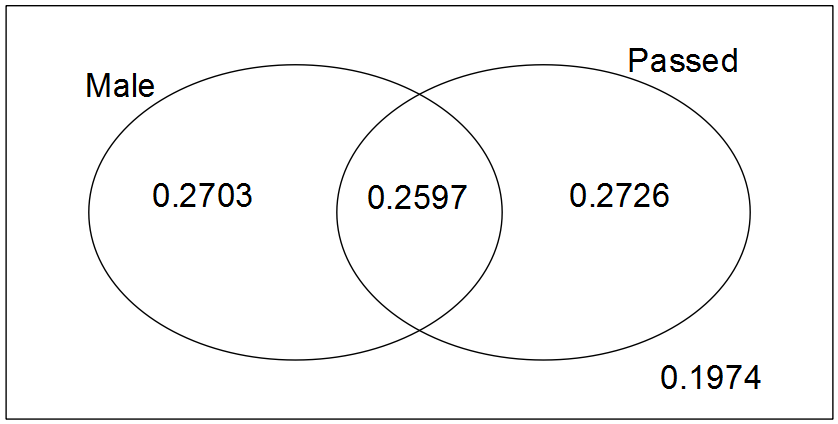
S30 = 1425



Sum of next 15 terms = S30 S15 = 1050 ✔ [7]



25. (a)



✔✔✔

(b) (i) 0.5323 ✔

(ii) 0.2726 ✔

(iii) 0.51 ✔

(iv) 0.8026 ✔ [7]

26. The particle’s initial displacement is 5 m to the right of the origin. ✔

∴ Initial velocity = 0 ✔ [2]

