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**SEMESTER TWO**

**MATHEMATICS**

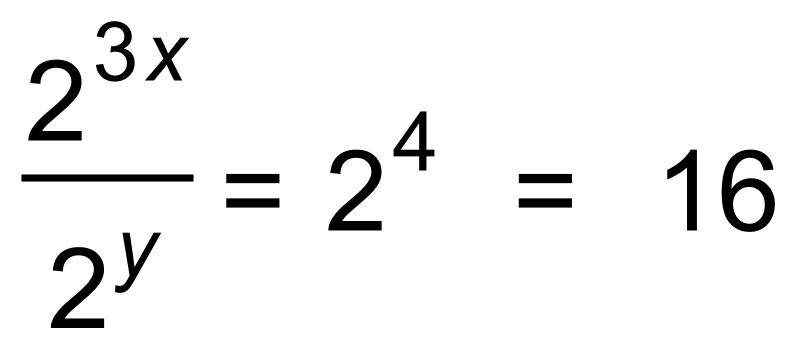
**METHODS**

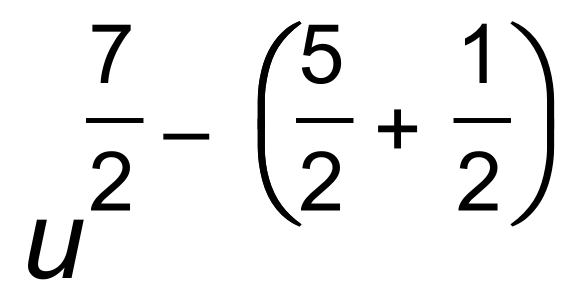
**UNITS 1 & 2**

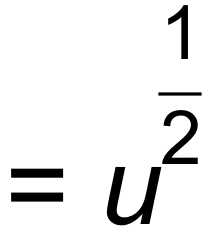
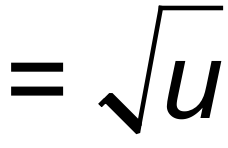
**2018**

**SOLUTIONS**

***Calculator−free Solutions***

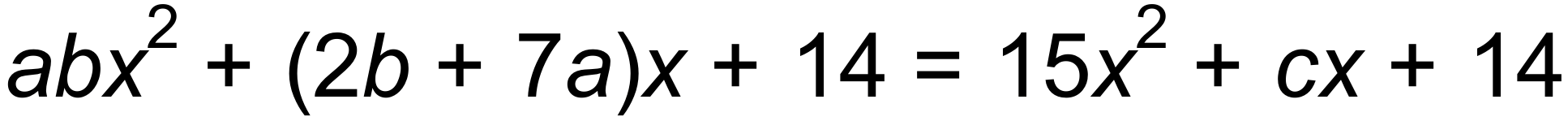
1. (a)  ✓✓

(b)  ✓

  ✓ [4]

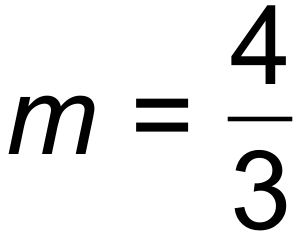
2. 

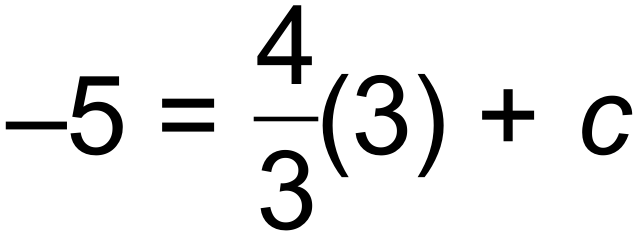
 ✓

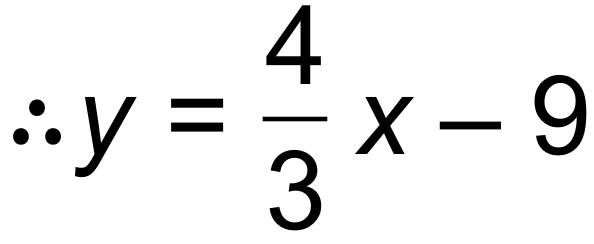


 ✓

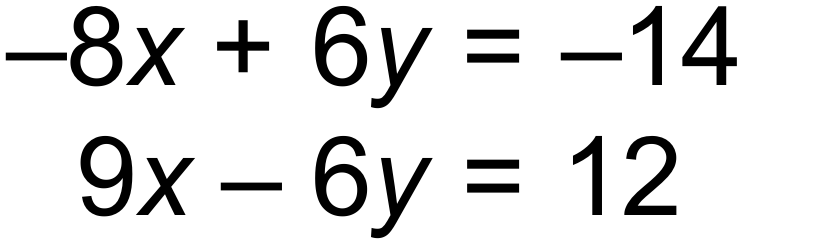
** ✓✓ [4]

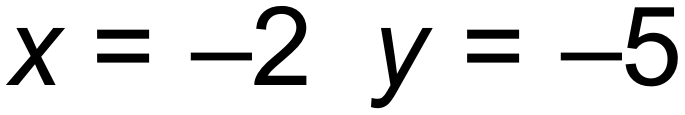
3. (a)  ✓

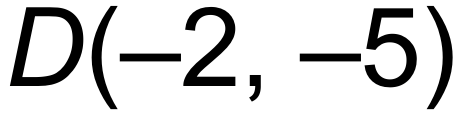


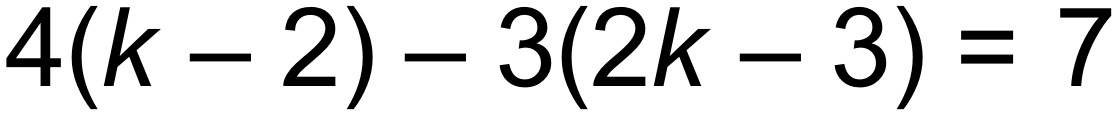
  ✓

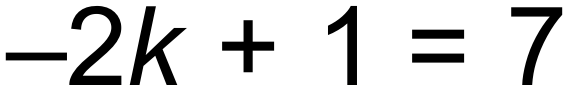
 ✓

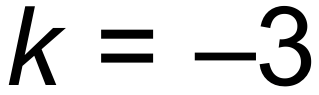
(b) ****

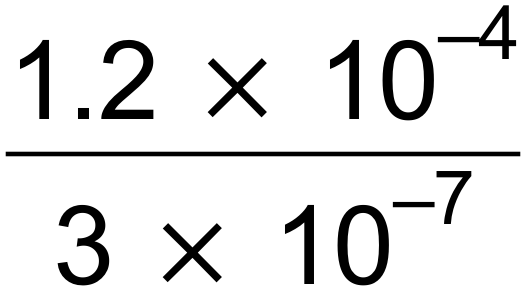
 ✓

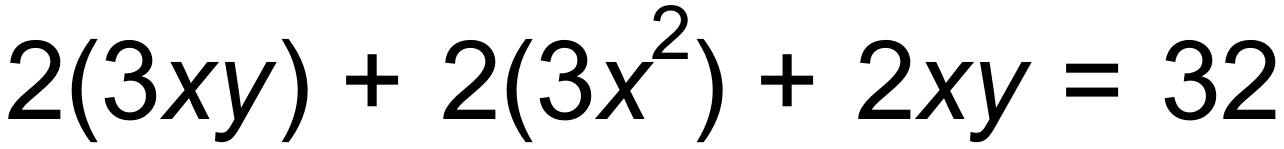
 ✓

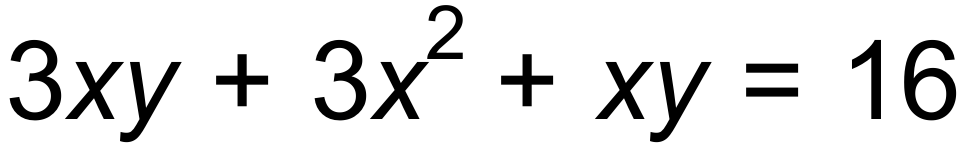
(c)  ✓

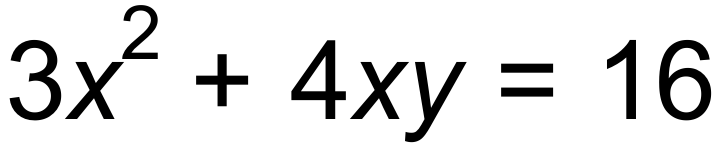


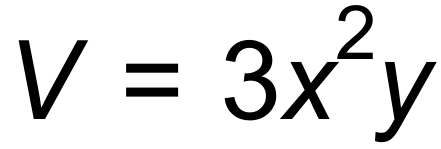
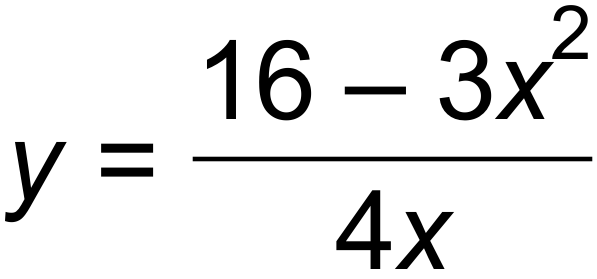
 ✓ [7]

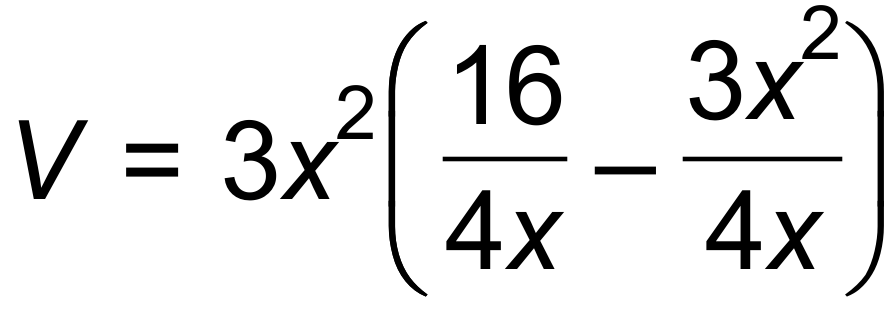
4.   = 400 ✓✓ [2]

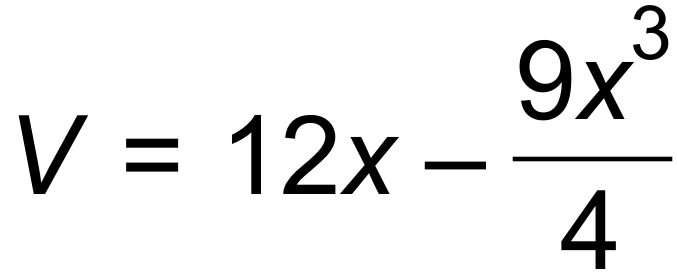
5. (a)  ✓

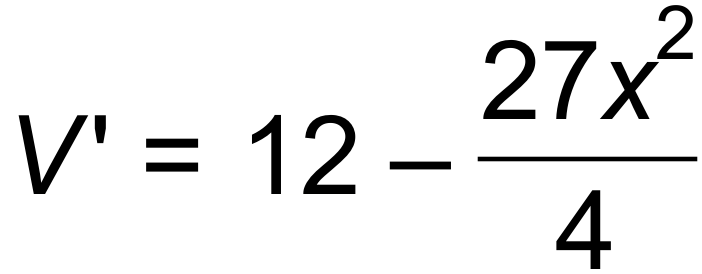
 ✓



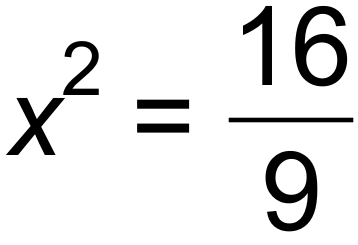
(b)  and  ✓

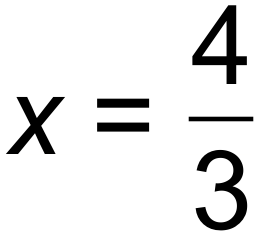
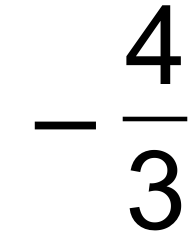
 ✓



(c) 

 ✓

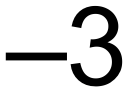
 ✓

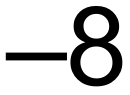
 (discard ) ✓

(d)

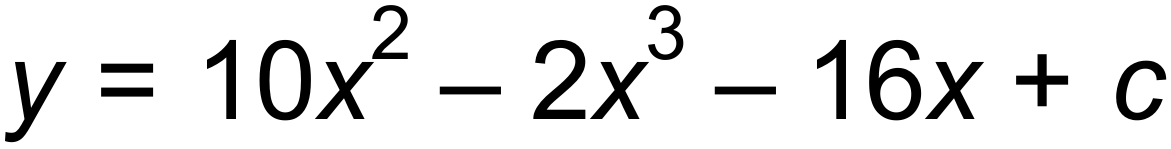
|  |  |  |  |
| --- | --- | --- | --- |
| V(x) | ↑ |  | ↓ |
| V’(x) | + | 0 |  |

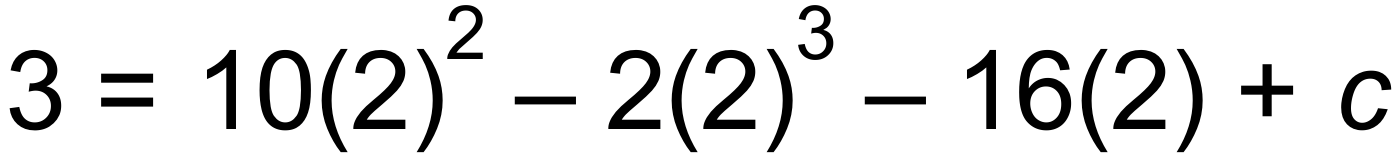
V has a maximum value ✓✓ [9]

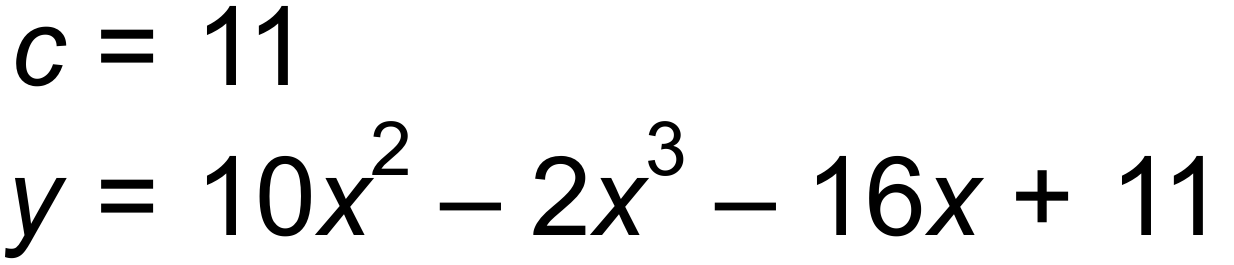
6. (a) Tn+1 = Tn +10 T1 =  ✓✓

(b) T2 =  ✓

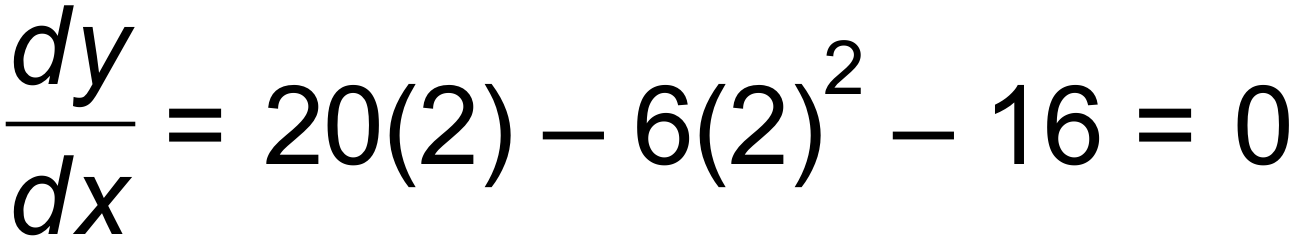
T3 = −32 ✓ [4]

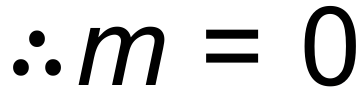
7. (a)  ✓

 ✓

 ✓

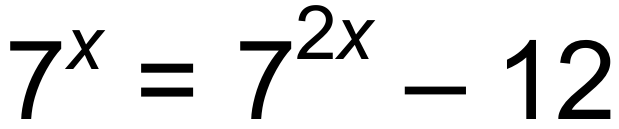
(b) Gradient of xaxis = 0

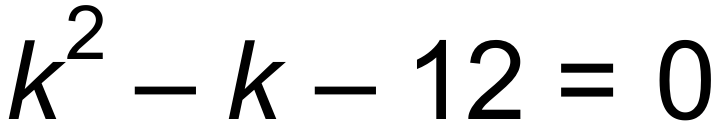
 ✓

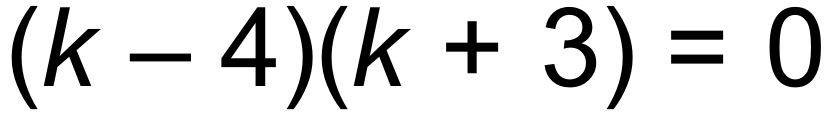
 Tangent is horizontal and parallel to the xaxis. ✓ [5]

8. (a) Vertical translation 12 units down ✓

Horizontal dilation by factor . ✓

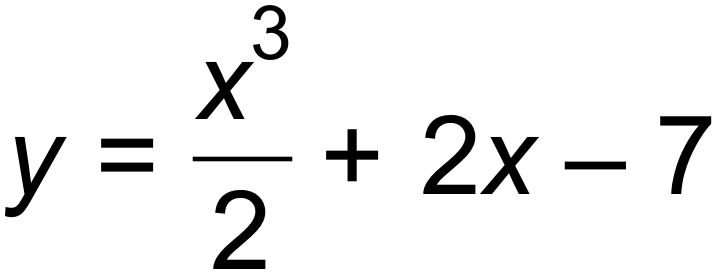
(b) 

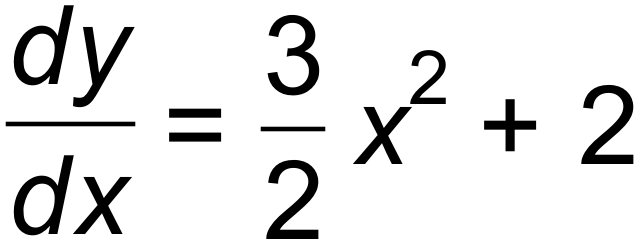
Let  be k.  ✓

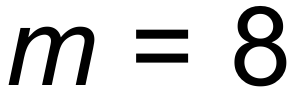
 ✓

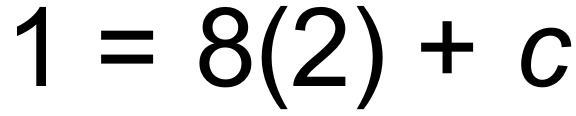
 ✓

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

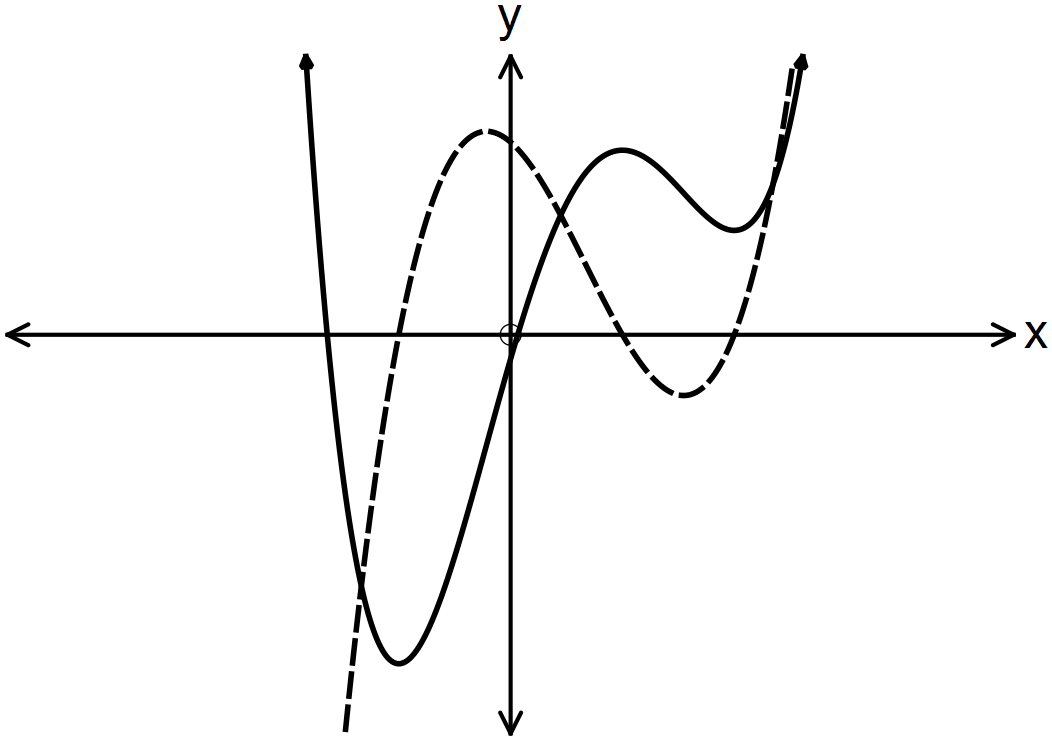
9. (a)  ✓

 ✓

 ✓



 ✓

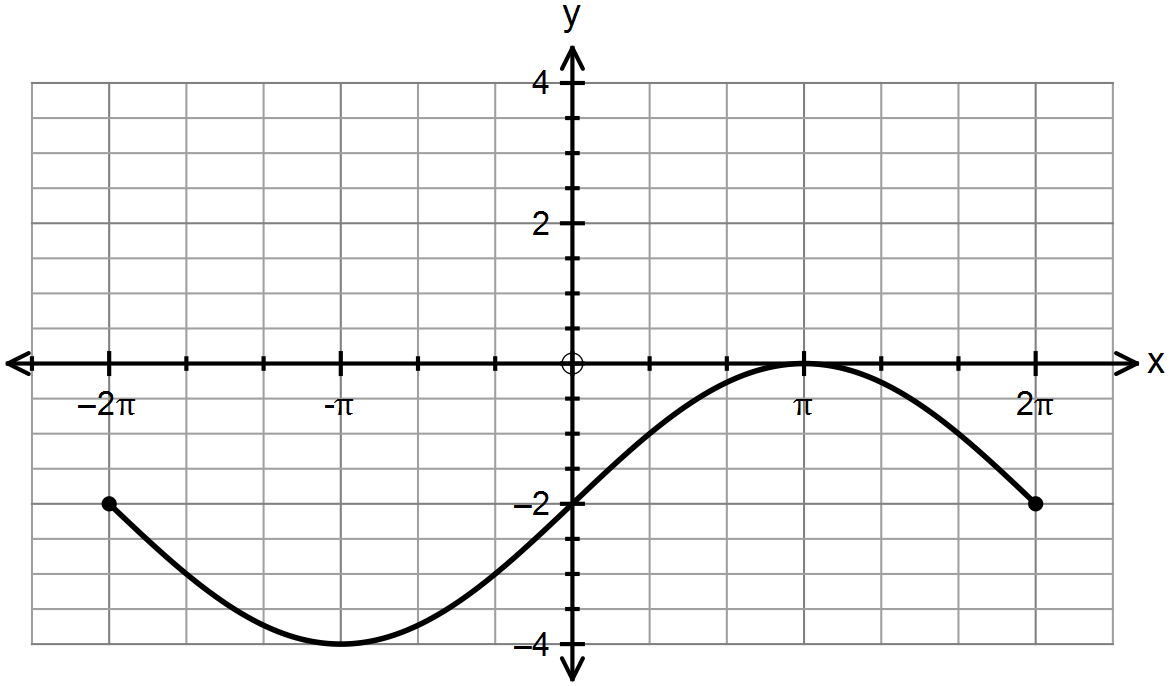
 (b)

✓✓ [6]

10. (a) Period  ✓

Amplitude = 2 ✓

(b)

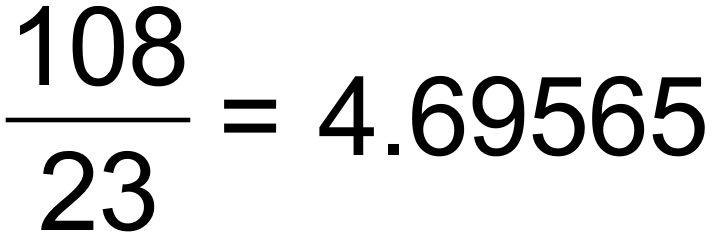


✓✓✓ [5]

***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 ✓

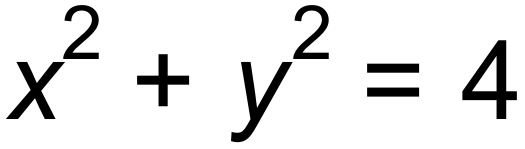
(c)  days ✓

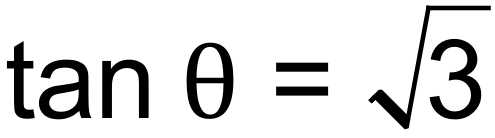
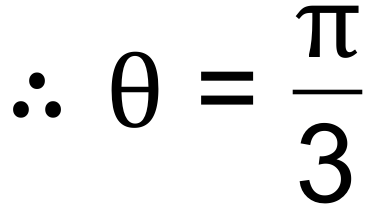
 hours

5 hours and 34 minutes ✓

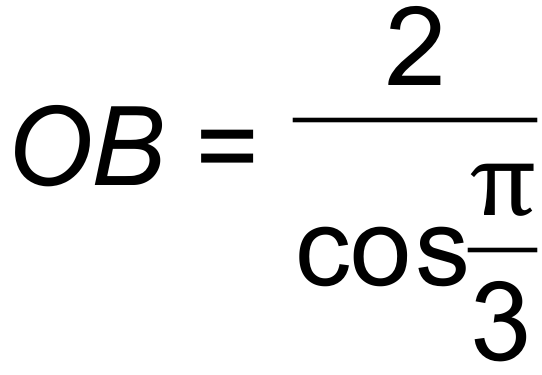
(d) T1 =155 T2 = 128 T3 = 99 T4 =68

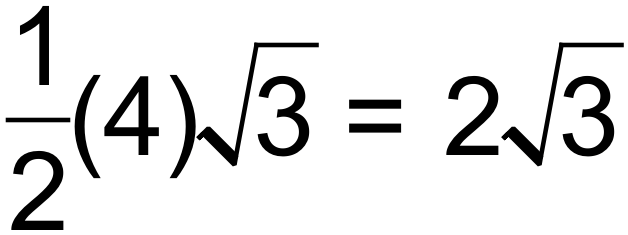
Tn+1 = Tn – (25 +2n) T0 = 180 ✓✓ [6]

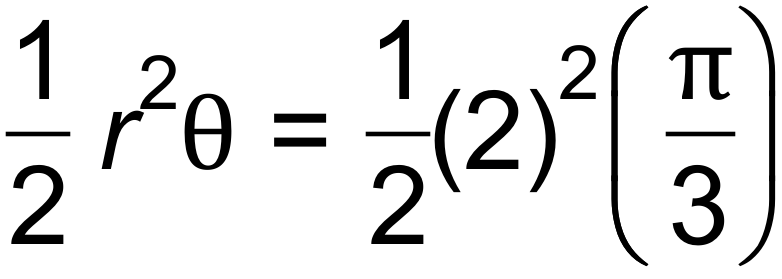
12. (a)  ✓

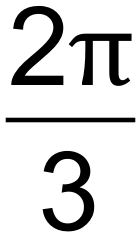
(b)   radians ✓

radius = 2 units ✓

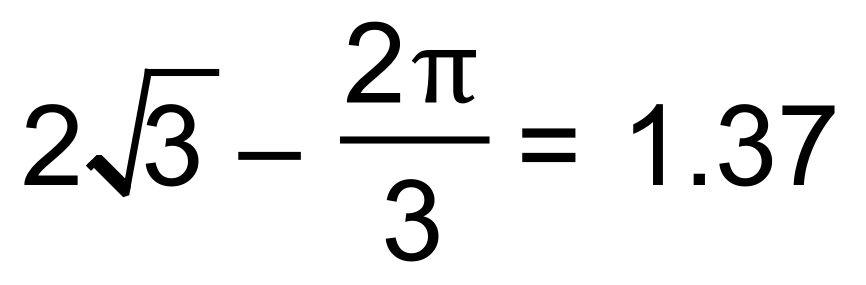
(c)  = 4

Therefore area of ΔAOB =  units2 ✓

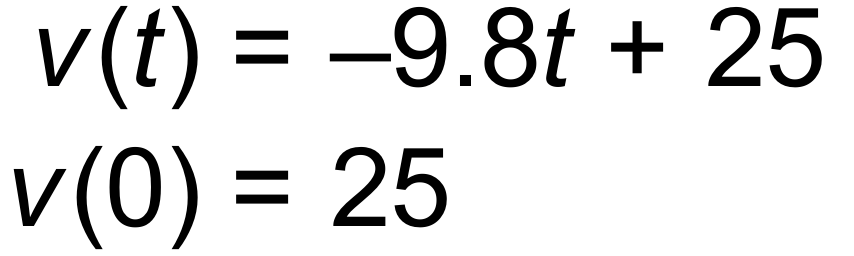
Area of sector = 

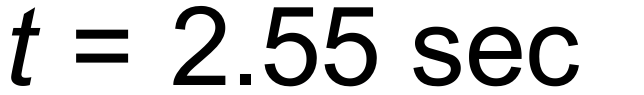
=  units2 ✓

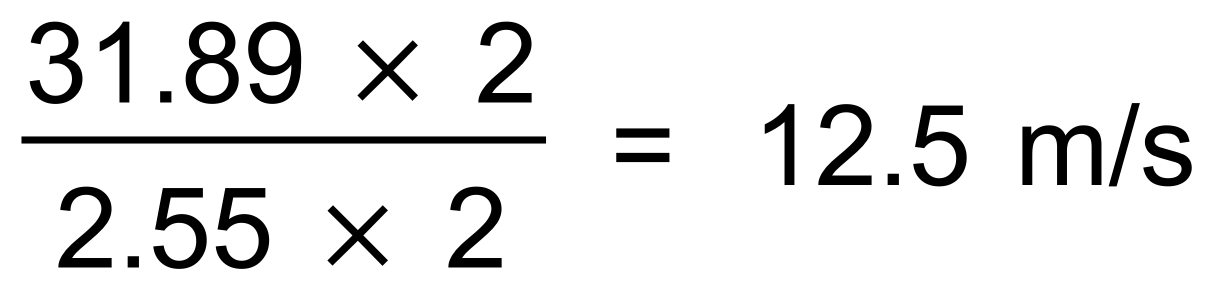
Area of shaded part = triangle – sector

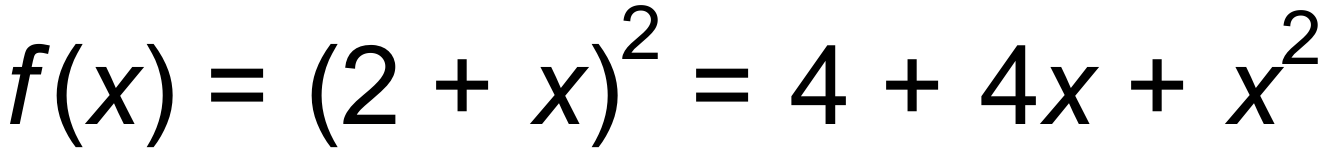
= units2 (3 sig fig) ✓ [6]

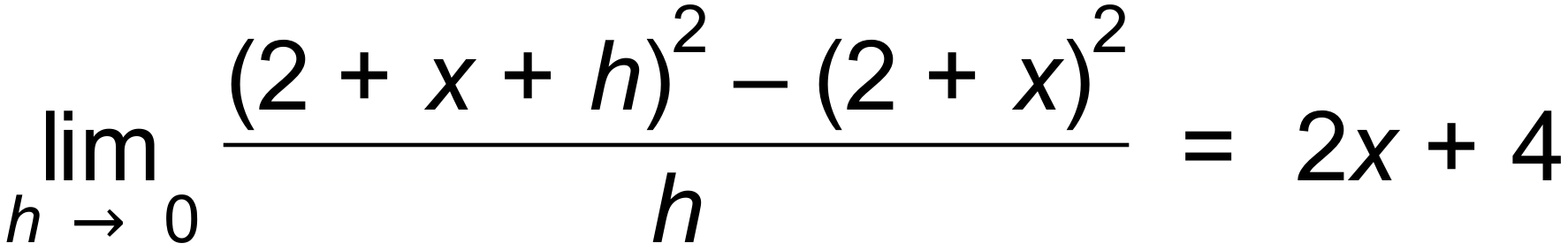
13. (a) 5.1 seconds ✓

(b)  ✓✓

(c) Maximum height is 31.89 m when 

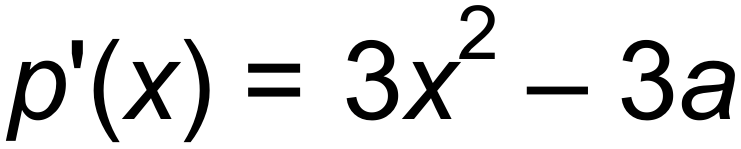
 ✓✓ [5]

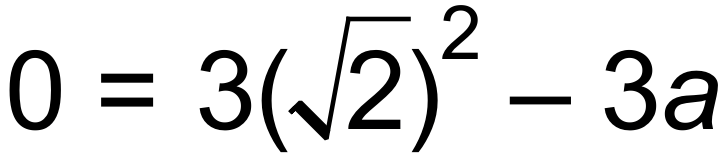
14. (a)  ✓

 ✓

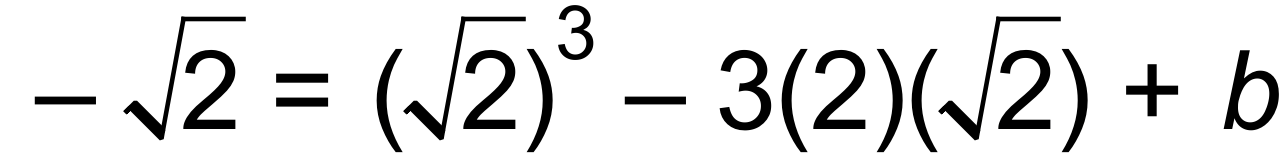
(b) (i)  ✓

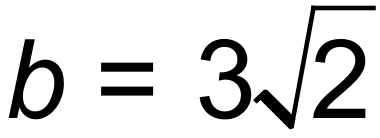
(ii) 18 ✓

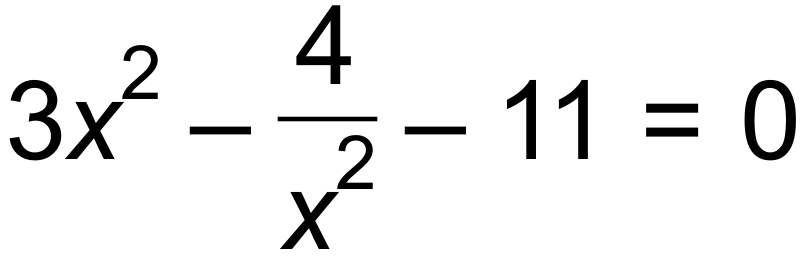
(c)  ✓



 ✓



 ✓ [7]

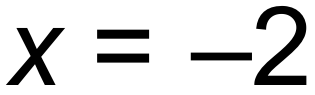
15. (a) 

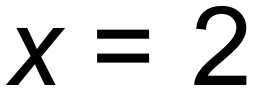
 ✓✓

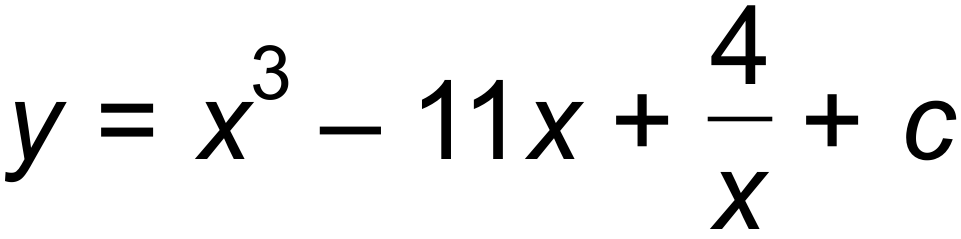
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | 2 |  |
|  | + | 0 |  | 0 | + |
| y | ↑ | - | ↓ | - | ↑ |

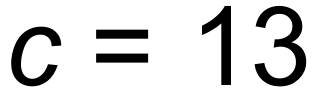
(b)

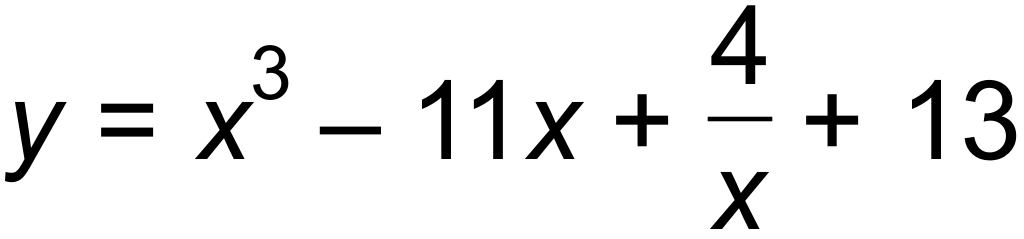
✓✓

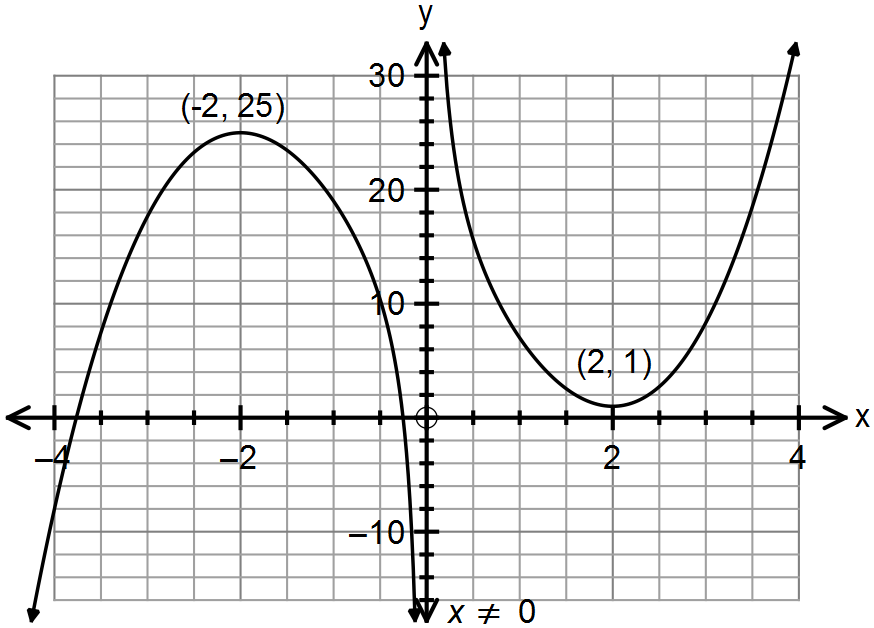
 Maximum

 Minimum ✓

(c)  ✓



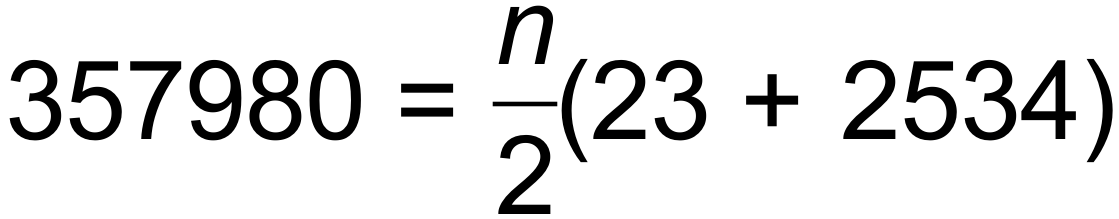
 ✓

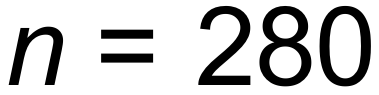
(d)

✓✓✓ [10]

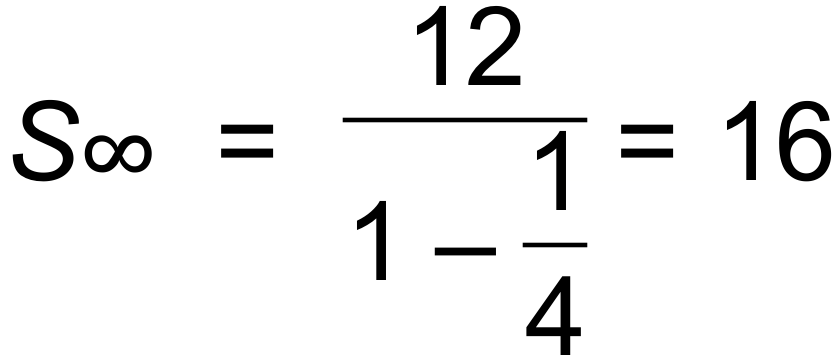
16. (a) (i) T100 = 23 +(99)(9) ✓

= 914 ✓

(ii)  ✓

 ✓

(b) (i) Tn+1 = Tn T1 = 12 ✓✓

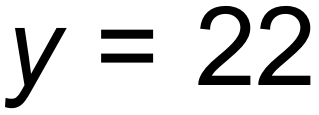
(ii)  ✓✓ [8]

17. (a) 92°C (initial temp of tea) ✓

22°C (room temp) ✓

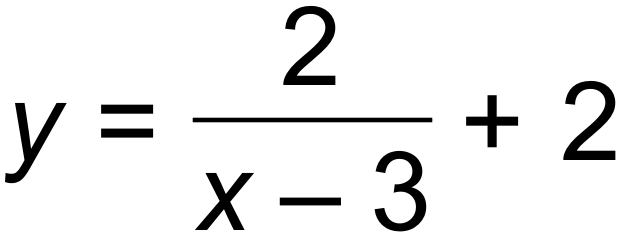
(b) After 4.12 mins and before 7.45 mins ✓✓

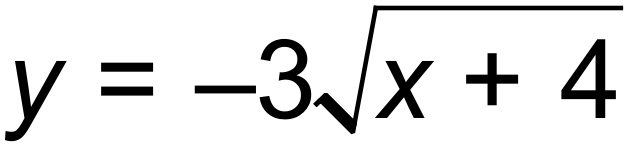


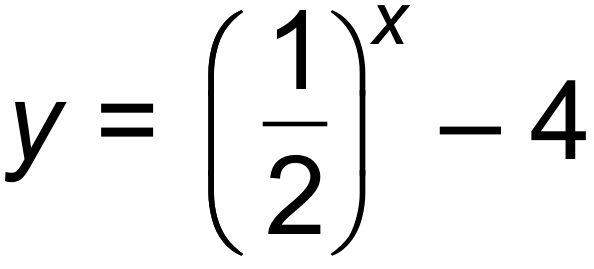
(c) Horizontal asymptote  ✓

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

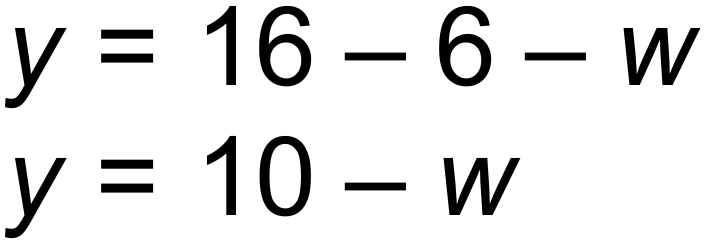
0.5+ k - 0.8 = 0.5k

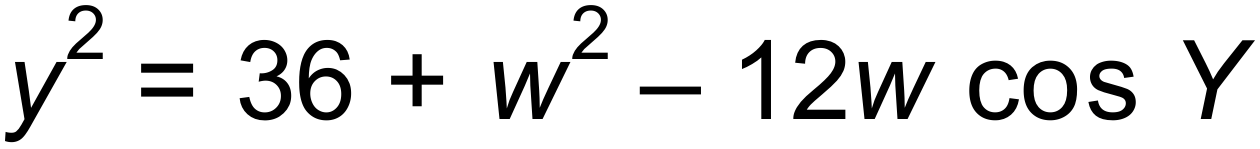
k = 0.6 = Pr (Y) ✓ [6]

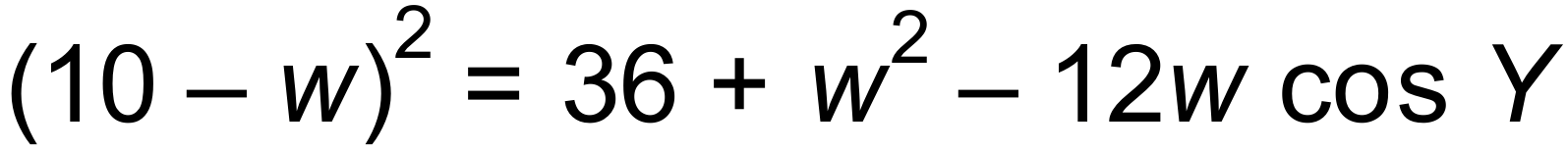
20. (a) 1, 3, 7, 15,…

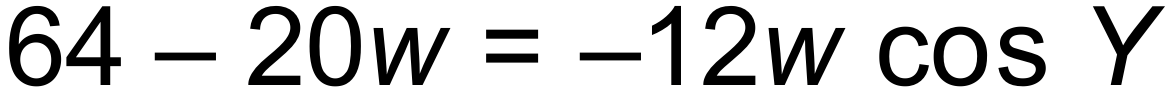
Tn+1 = Tn + 2n T1 = 1 ✓✓

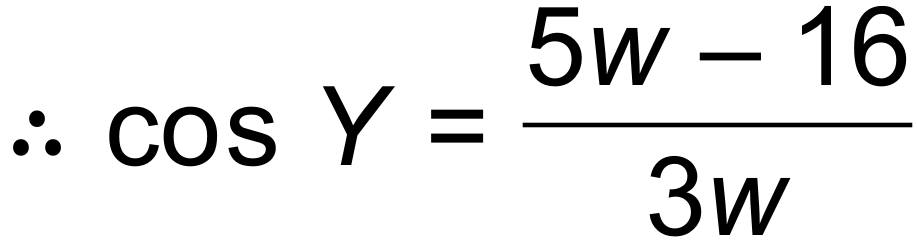
(b) 20 sets ✓ [3]

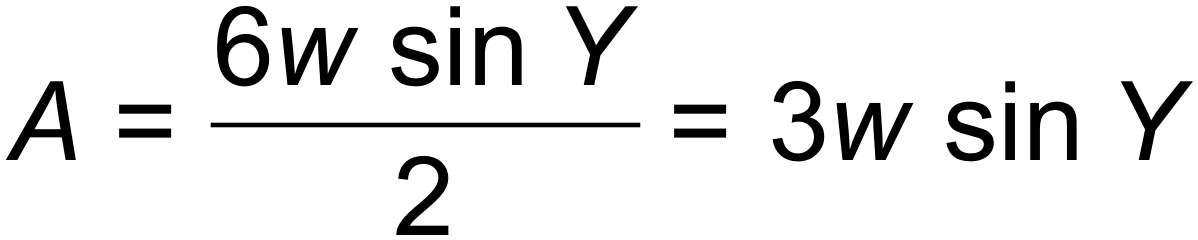
21. (a) (i)  ✓

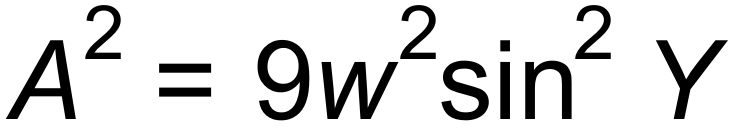
(ii)  ✓

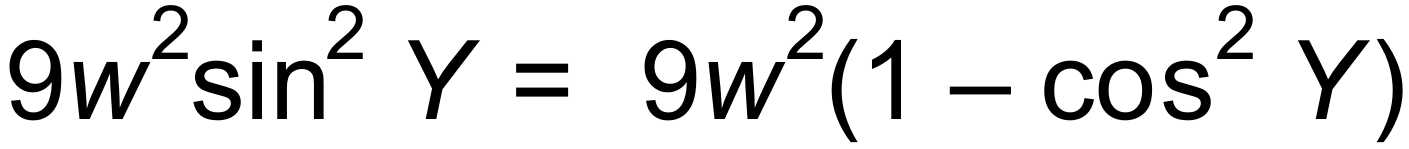
(iii)  ✓

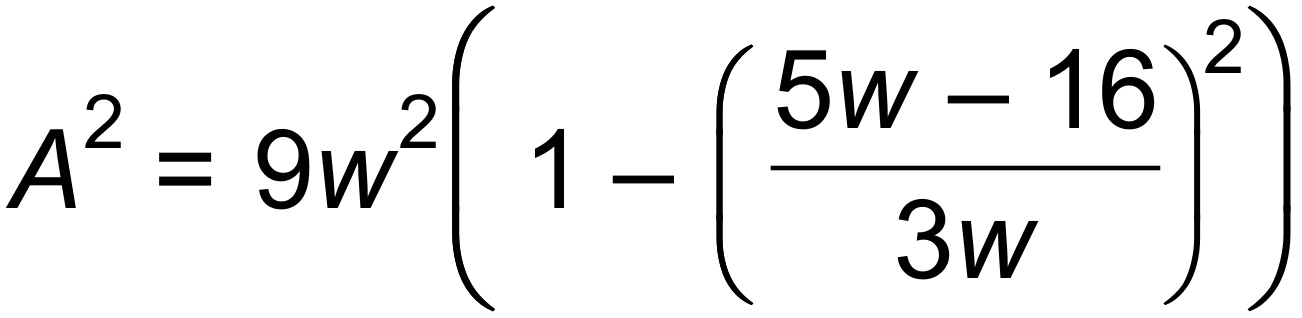
 ✓



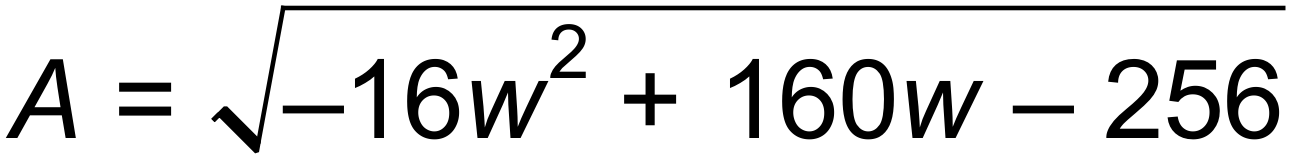
(b) (i)  ✓

 ✓

(ii)  ✓

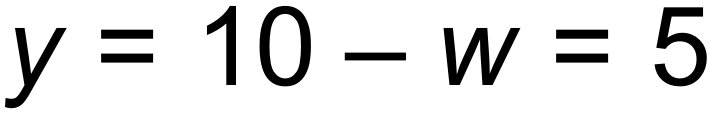
 ✓

 ✓

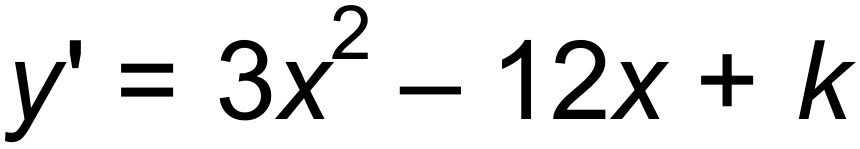
(c) (i) 

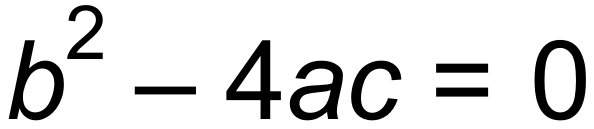
 ✓

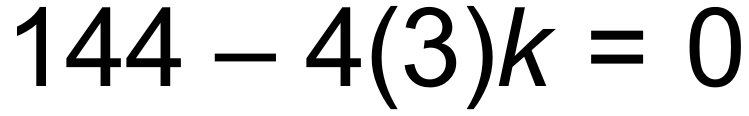
Maximum area = 12 units2 ✓

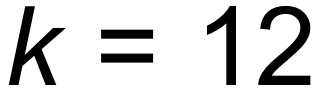
(ii) 

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 ✓

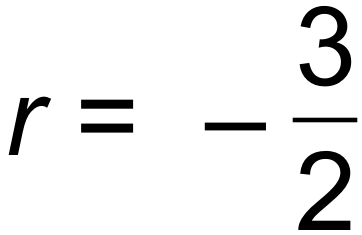
(1.085)t = 10(0.95)t

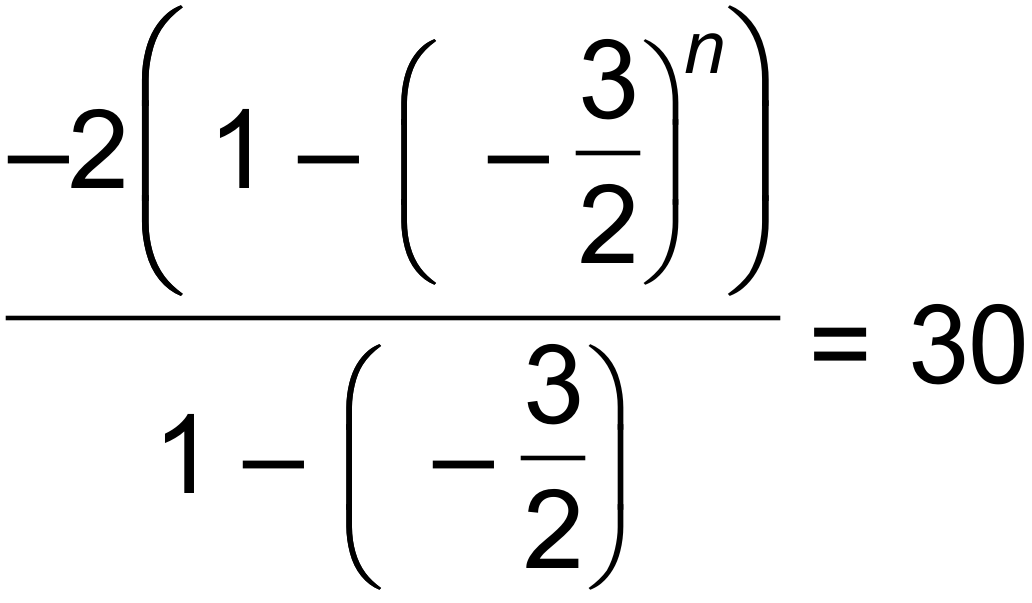
 years ✓

After 18 years there will be more wallabies. ✓

(b) Wn+1 = 1.085 Wn W0 = 655 ✓

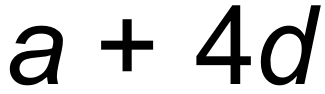
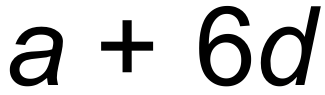
W5 = 985 ✓ [5]

24. (a)  ✓

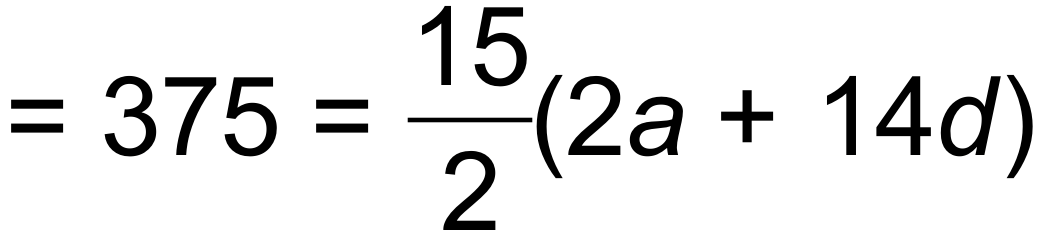
****  ✓



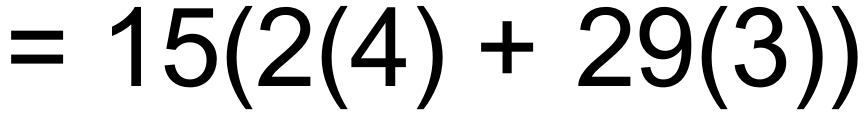
 ✓

(b) T5 =  and T7 = 

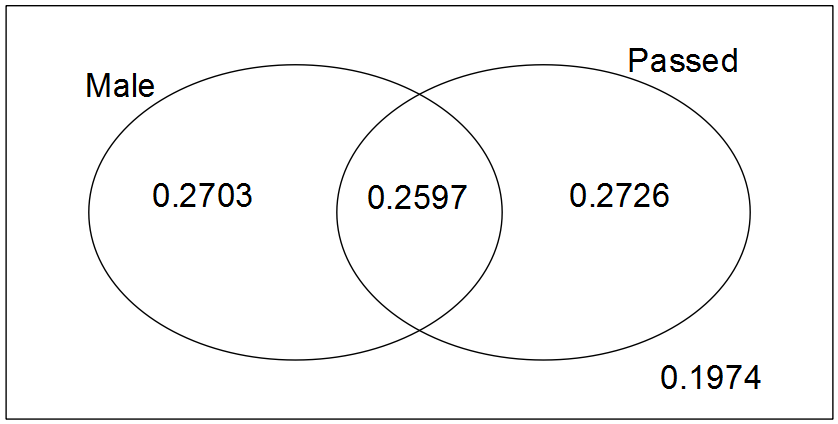
 (eq 1) ✓

S15  (eq 2) ✓

 ✓

S30  = 1425

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

25. (a)

✓✓✓

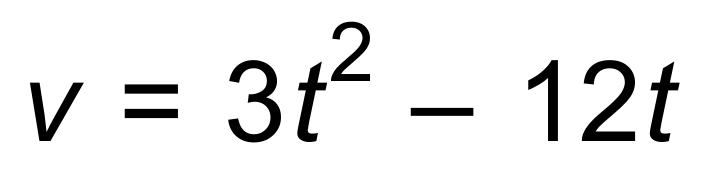
(b) (i) 0.5323 ✓

(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]