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**SEMESTER TWO**

**MATHEMATICS**

**METHODS**

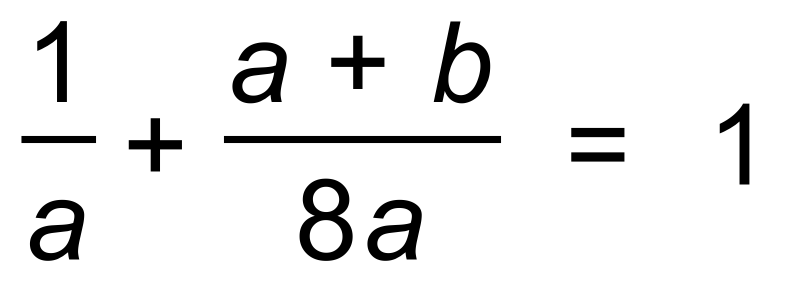
**UNIT 1**

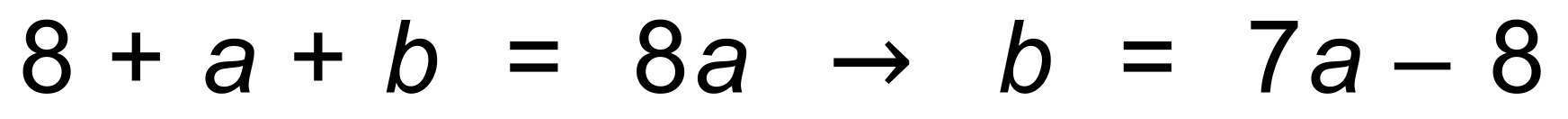
**2019**

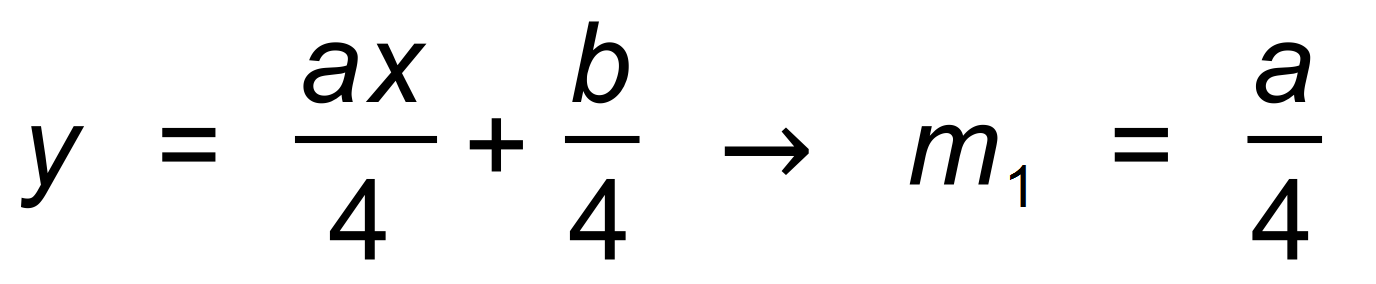
**SOLUTIONS**

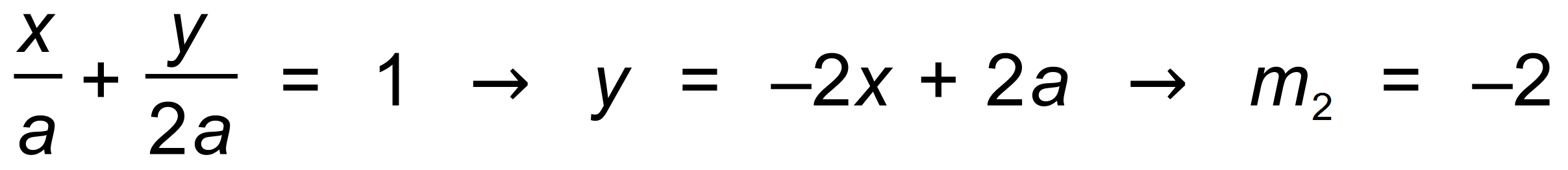
**Calculator−free Solutions**

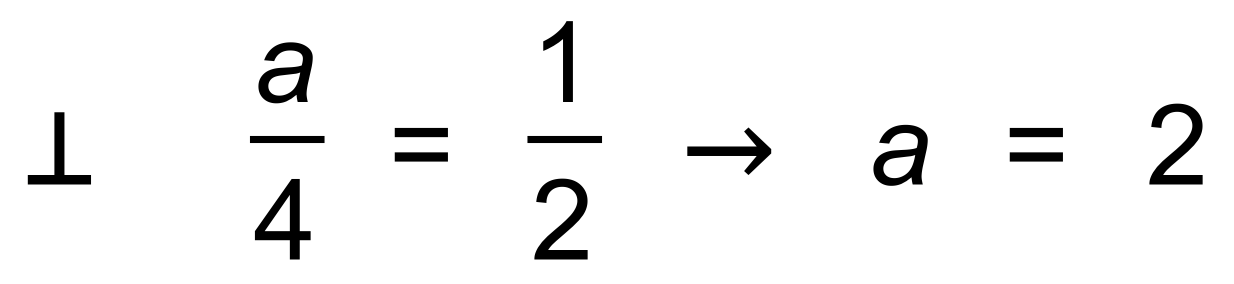
1. (a) Since *x* = 1 then  ✓

∴  ✓

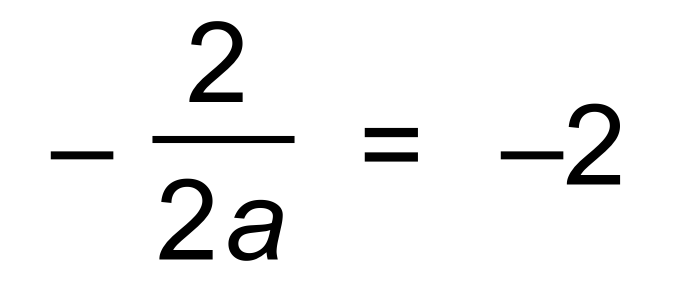
∴  ✓

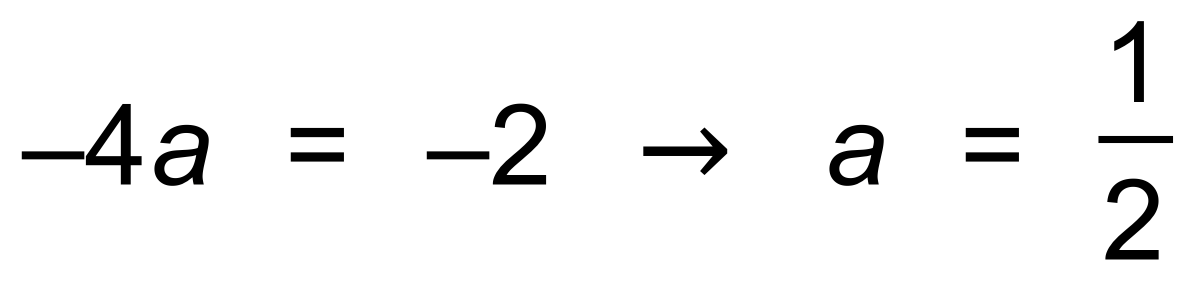
(b)  ✓

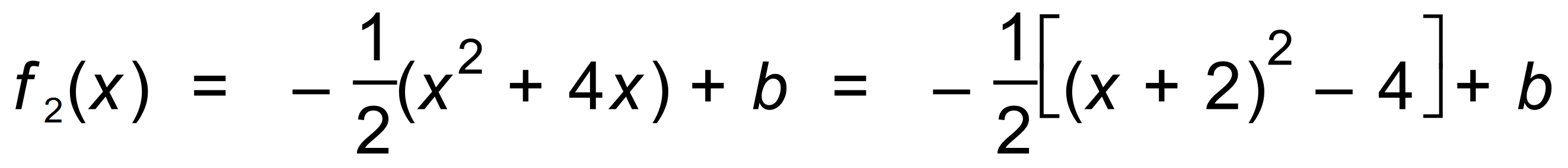
 ✓

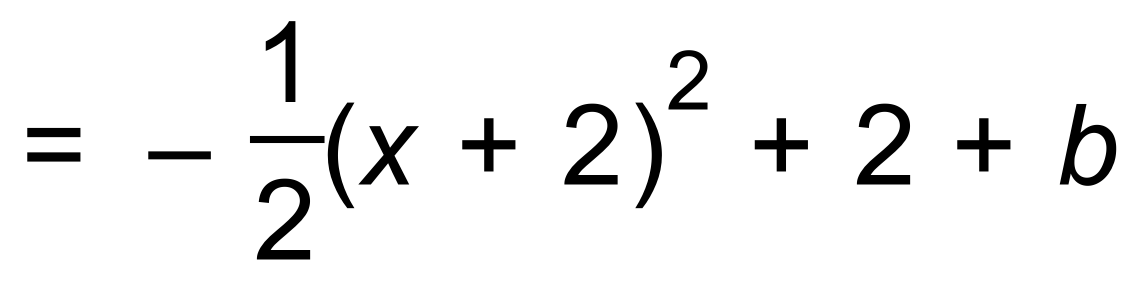
Since  ✓

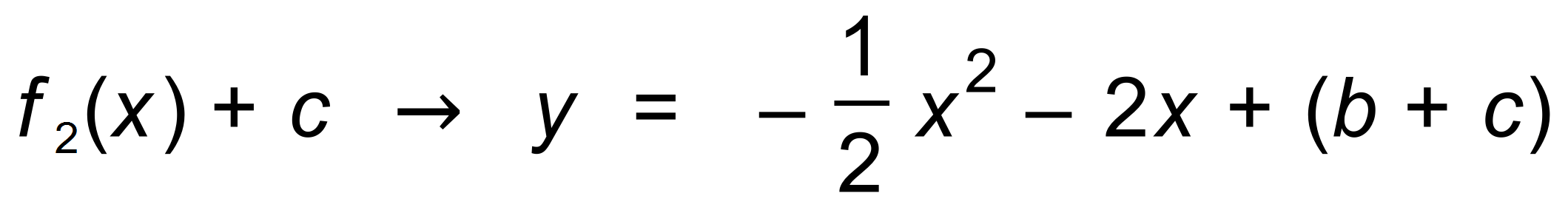
and *b* = 14 − 8 = 6 ✓ [7]

2. (a)  ✓

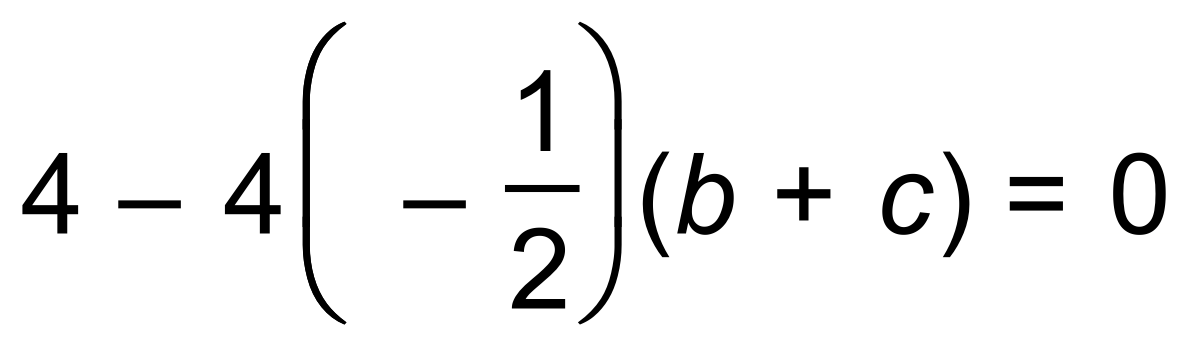
∴  ✓

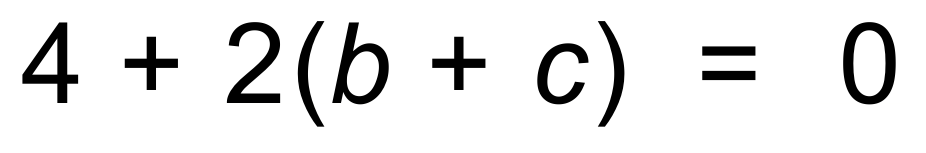
(b)  ✓

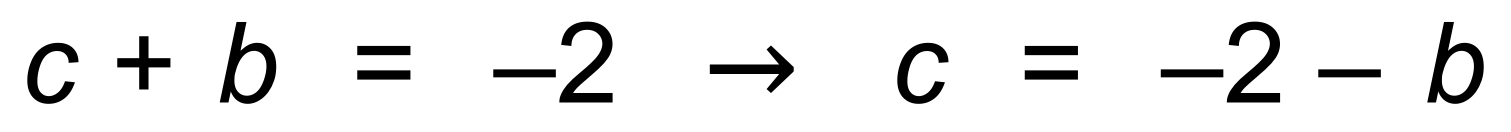
 ✓

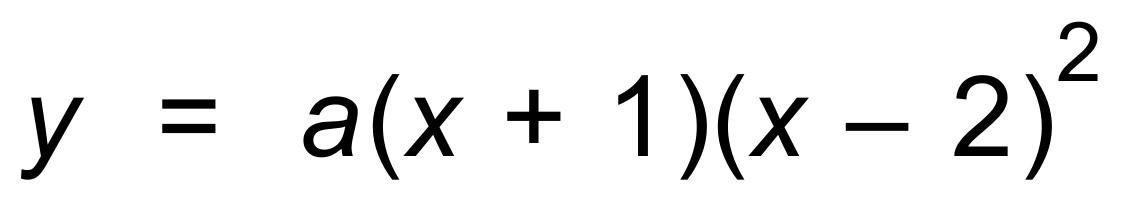
(c) Translation of *c* up  ✓

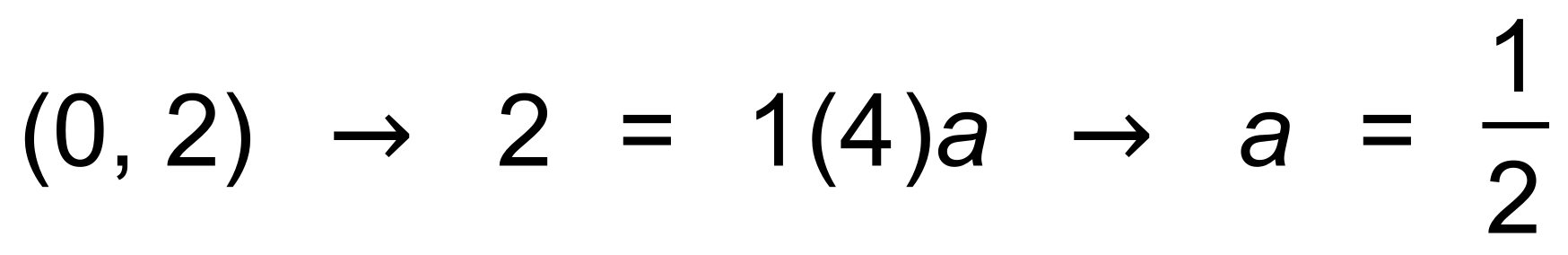
Since tangential, *b*2 − 4*ac* = 0

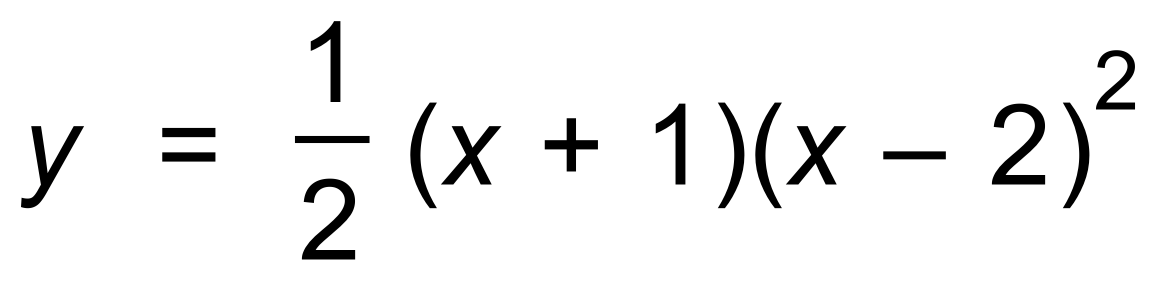
∴  ✓

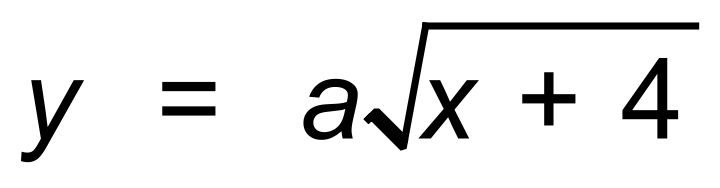
∴  ✓

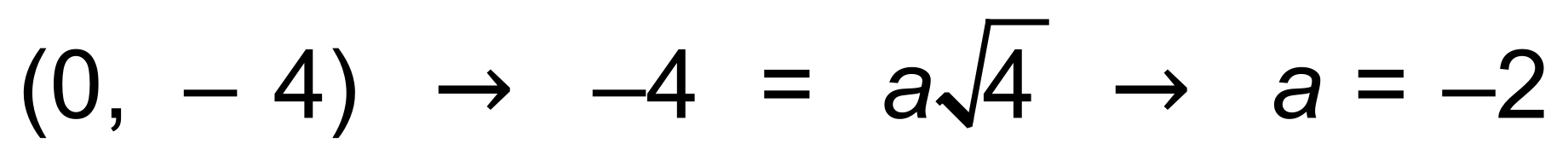
∴  ✓ [8]

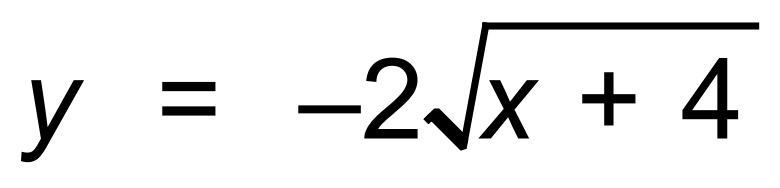
3. (a)  ✓

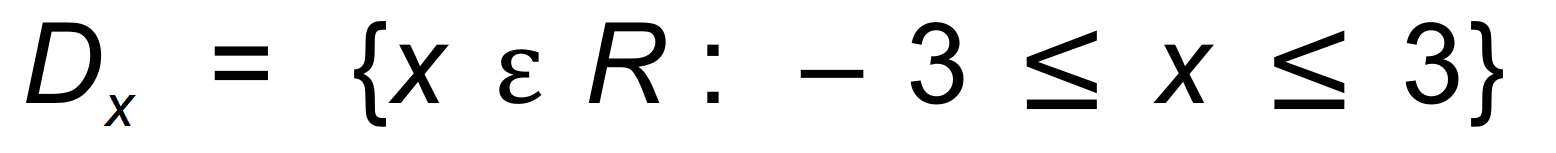
∴ 

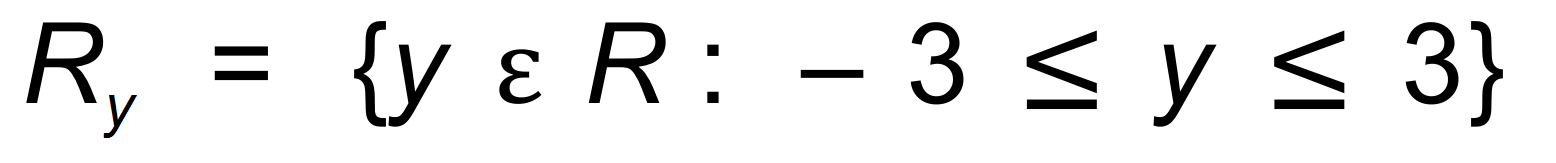
∴  ✓

(b)  ✓

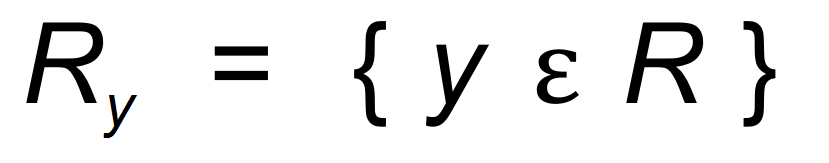
∴  ✓

∴  [4]

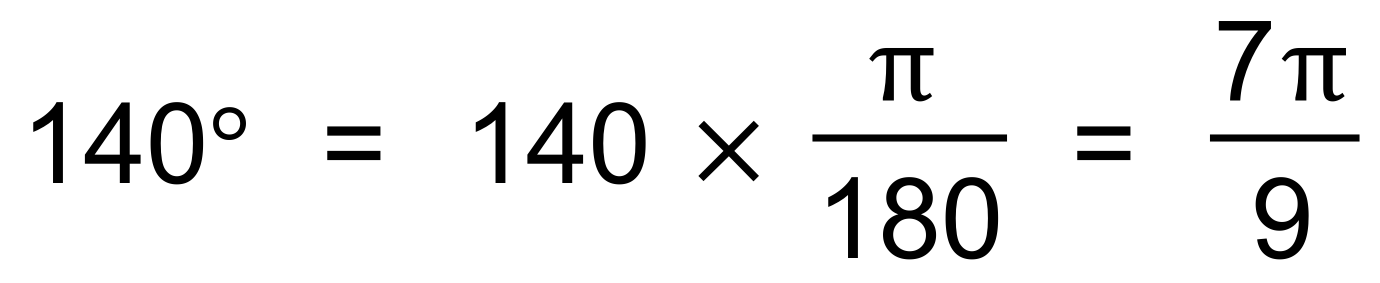
4. (a)  ✓

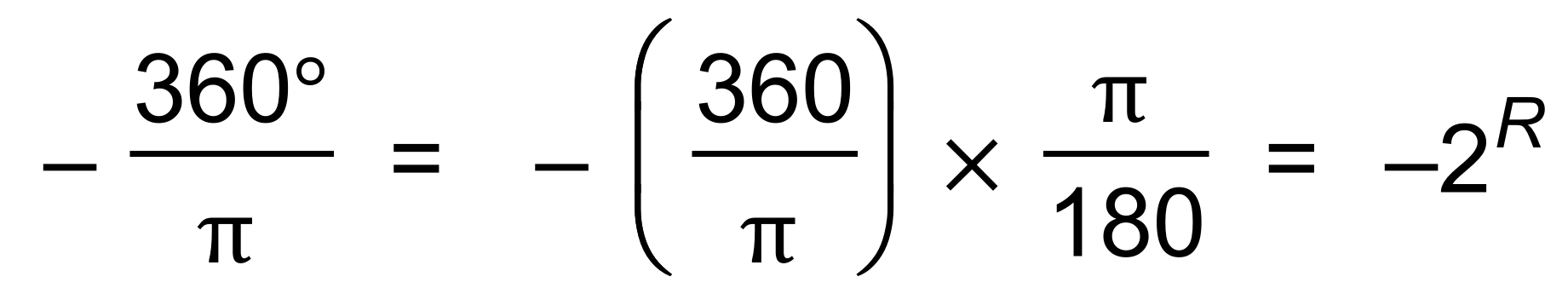
 ✓

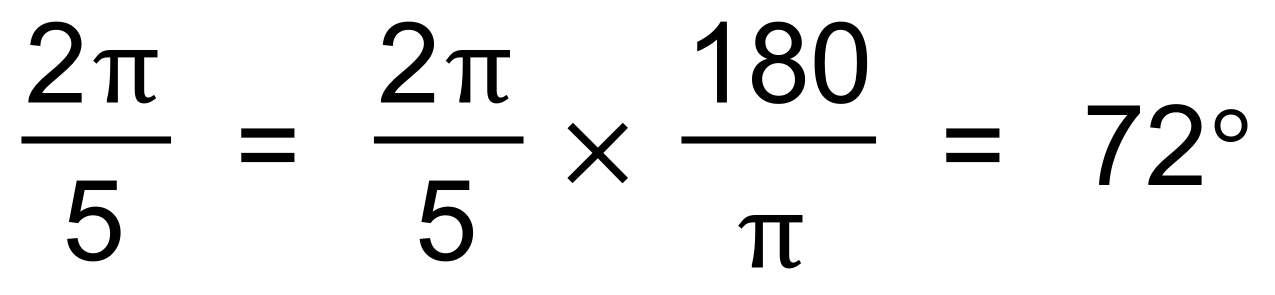
(b)  ✓

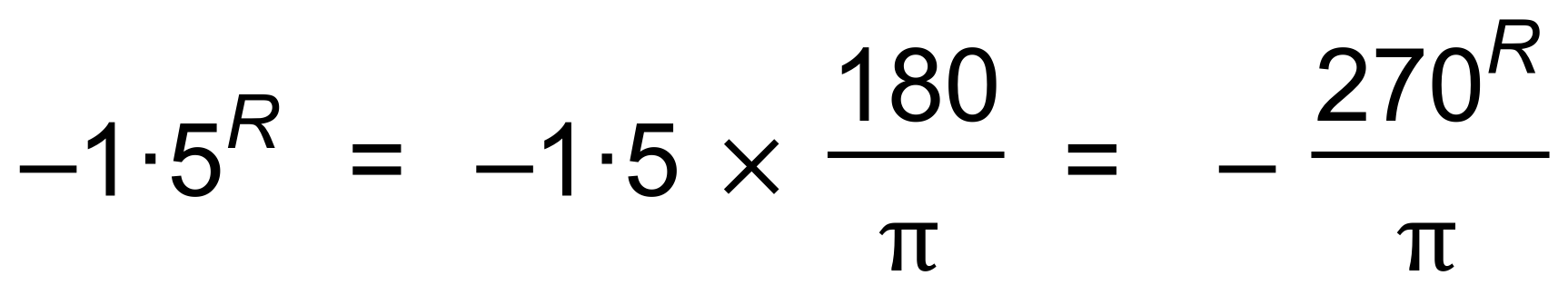
 ✓

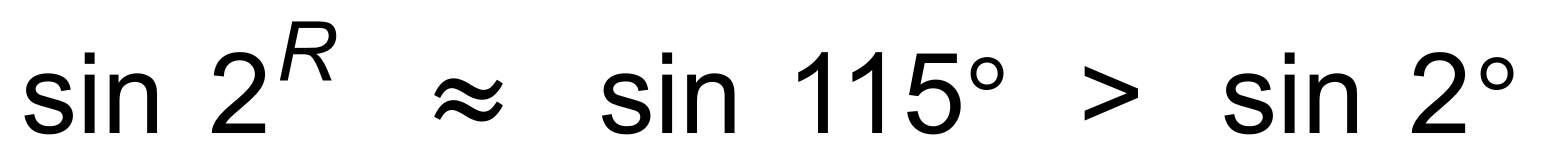
(c) There is a one to many mapping or vertical line test fails ✓ [5]

5. (a) (i)  ✓

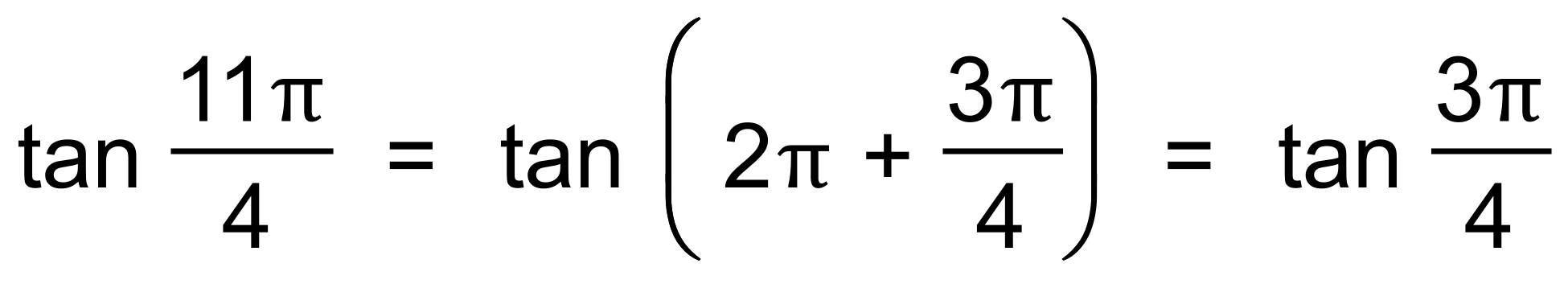
(ii)  ✓

(b) (i)  ✓

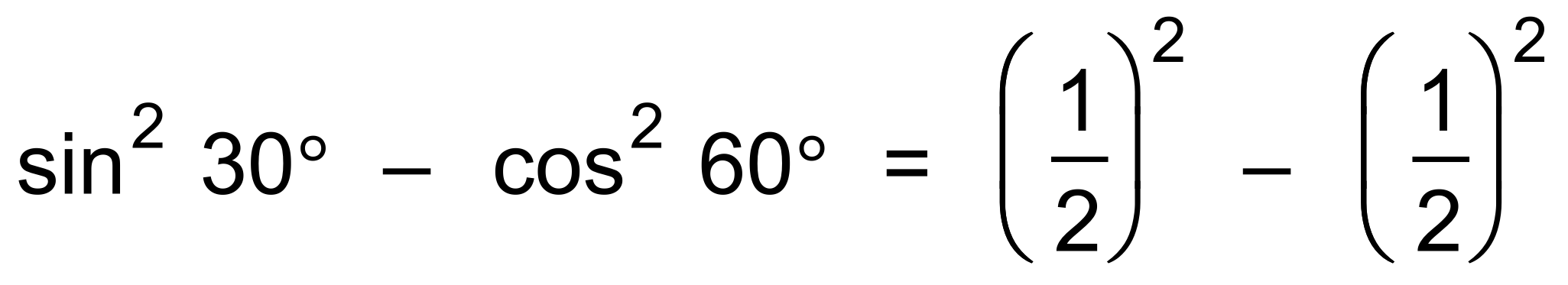
(ii)  ✓

(c)  ✓

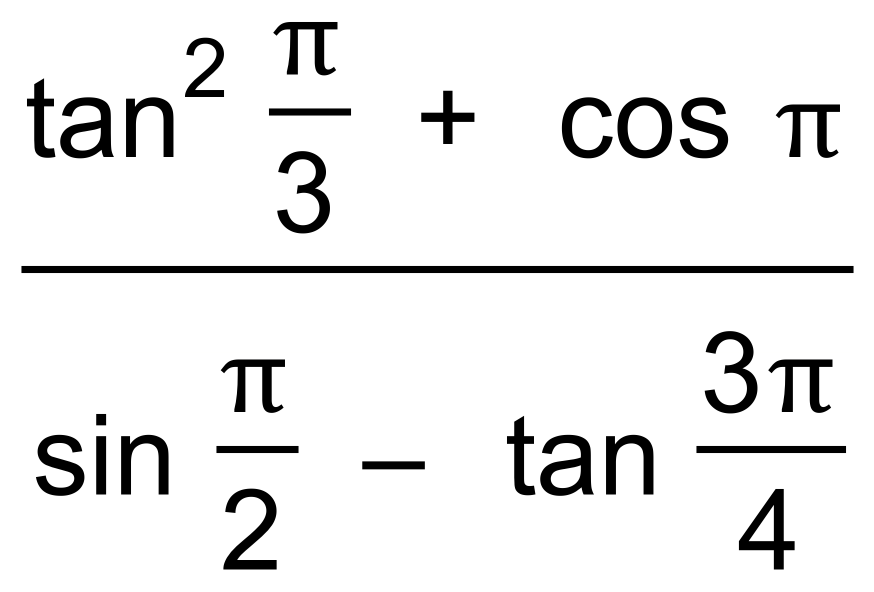
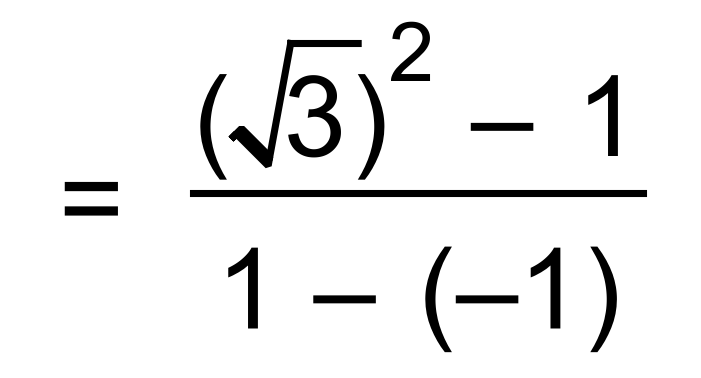
since it has a higher y value in the Unit circle. ✓ [6]

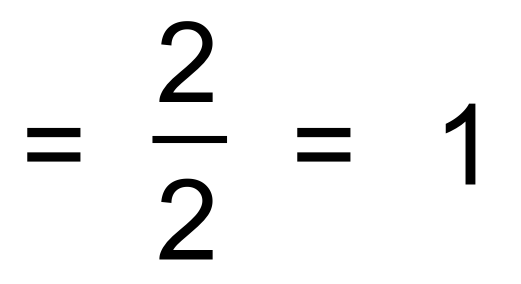
6. (a)  ✓

= −1 ✓

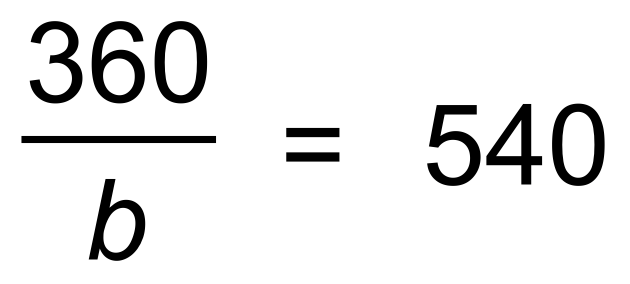
(b)  ✓

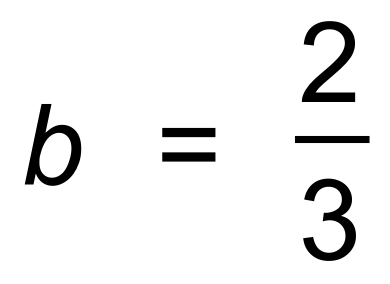
= 0 ✓

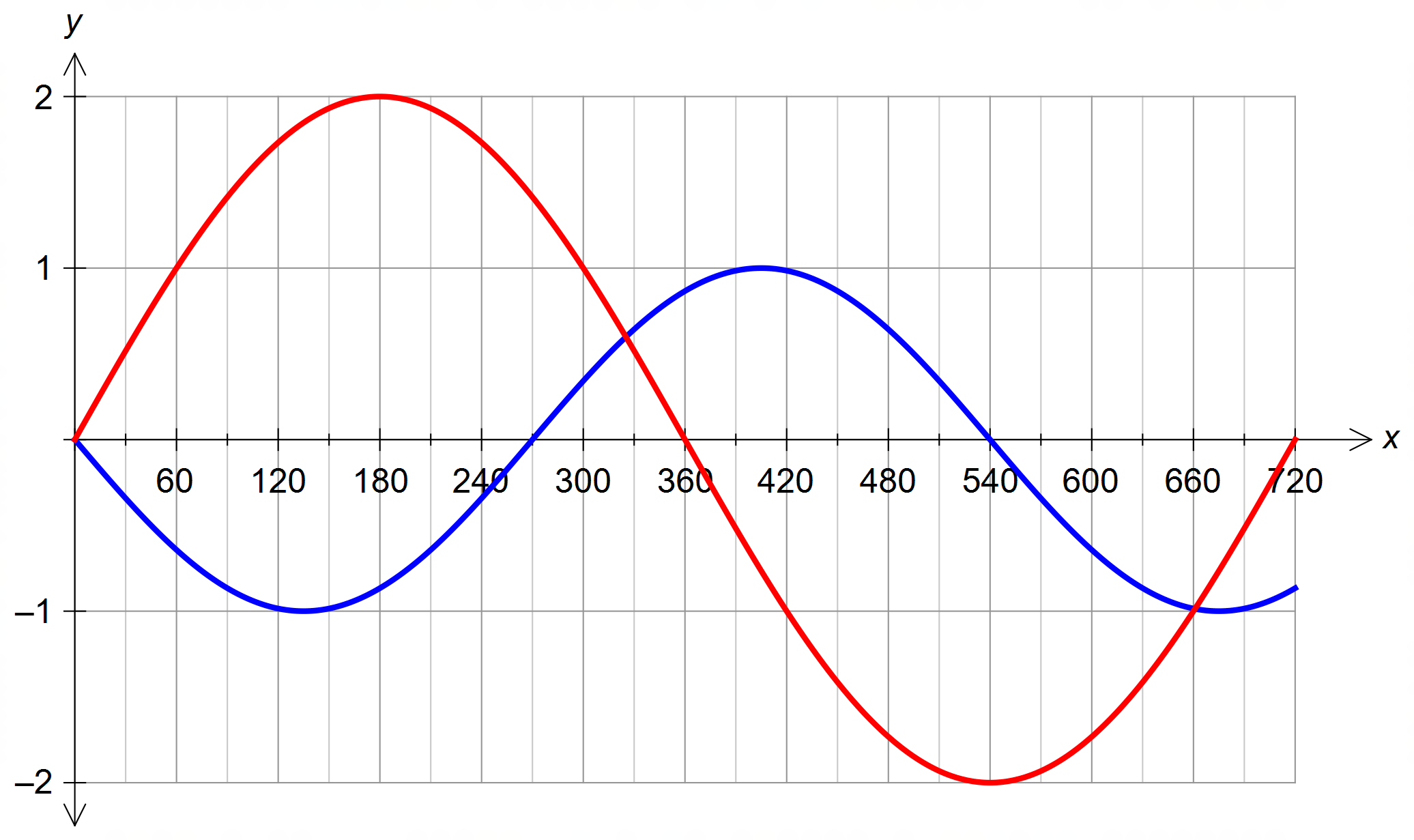
(c) **  ✓✓

 ✓ [7]

7. (a) a = −1 ✓

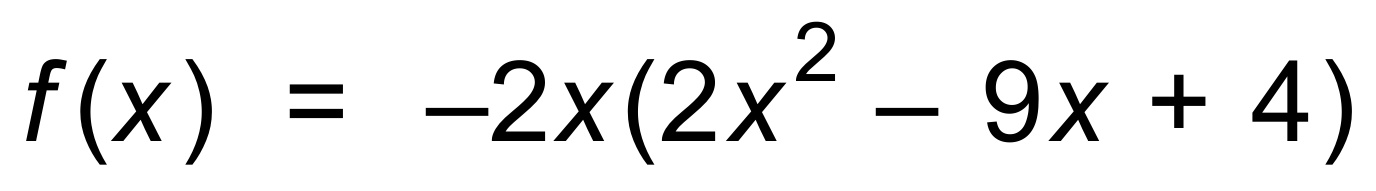
 ✓

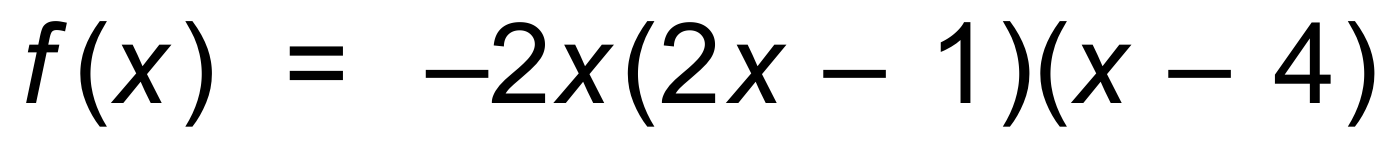
∴  ✓

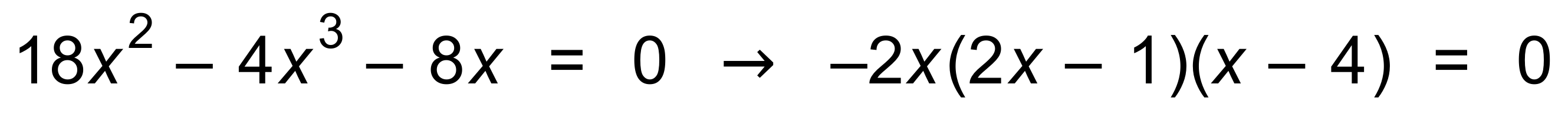
 (b)

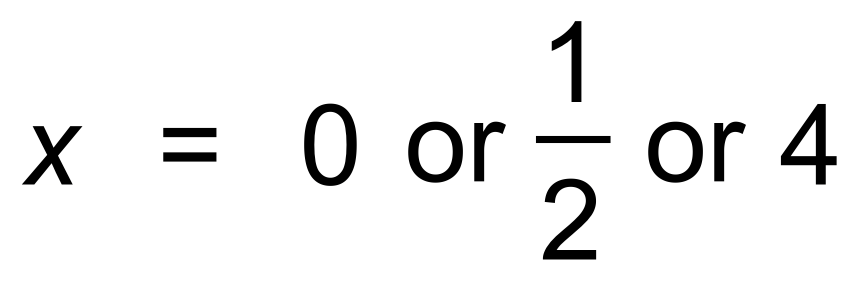
✓✓

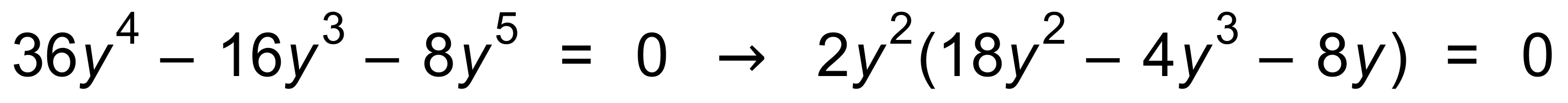
(c) 0°, 330°, 660° ✓✓✓ [8]

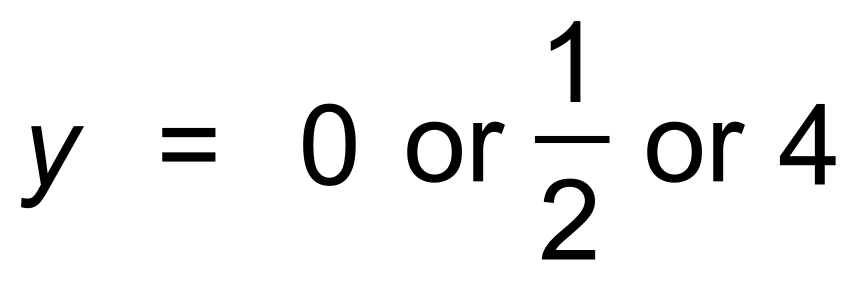
8. (a)  ✓

∴  ✓

(b) (i) 

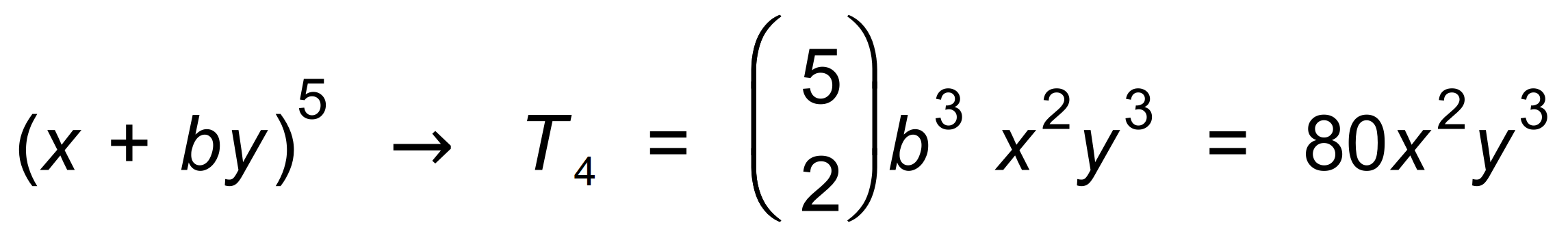
∴  ✓

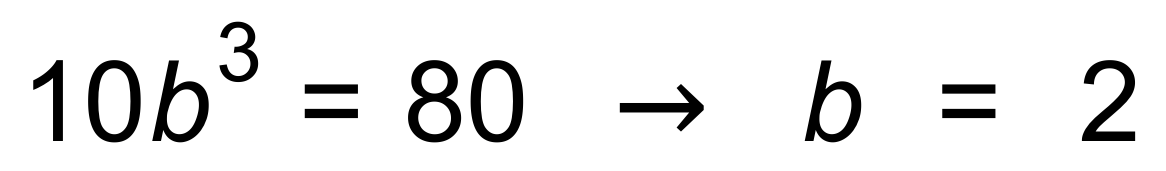
(ii) 

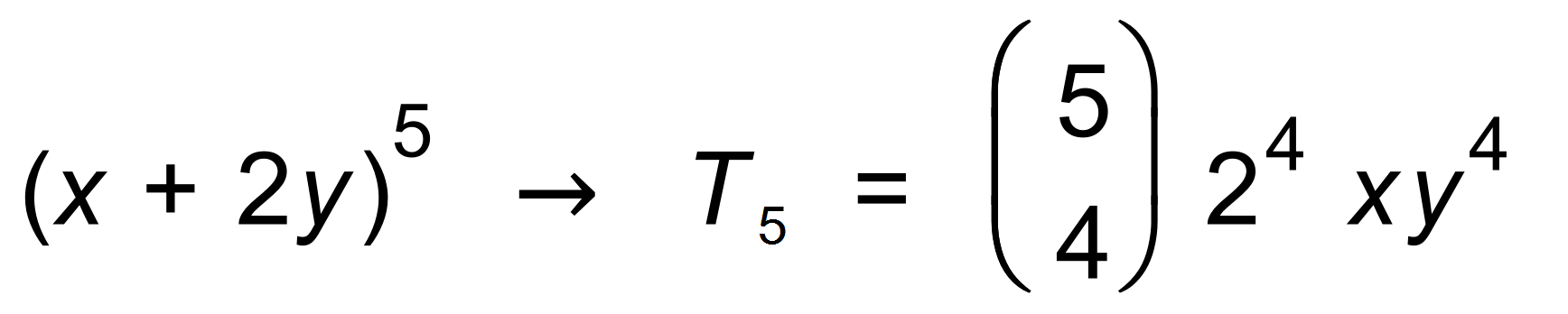
∴  ✓✓ [5]

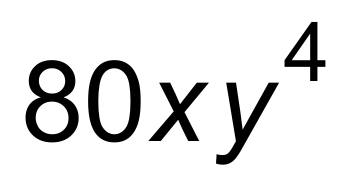
**Calculator−Assumed Solutions**

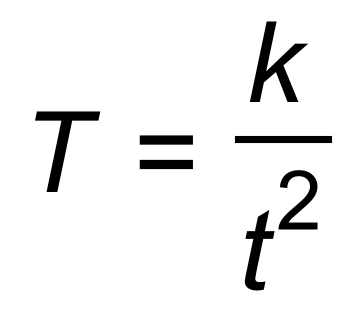
9. (a) n = 5 ✓

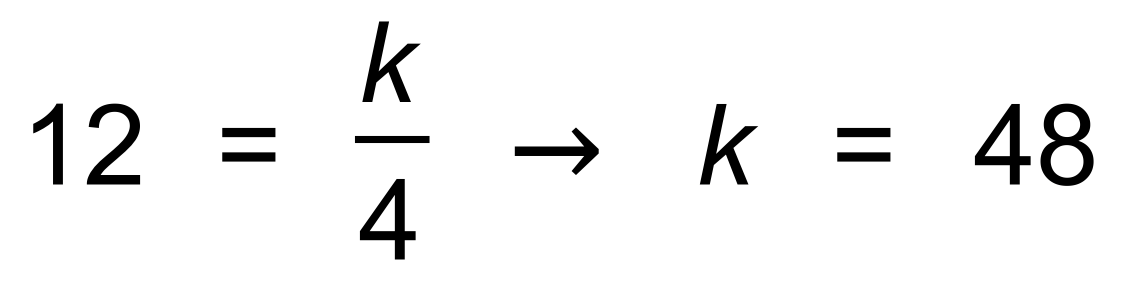
(b)  ✓

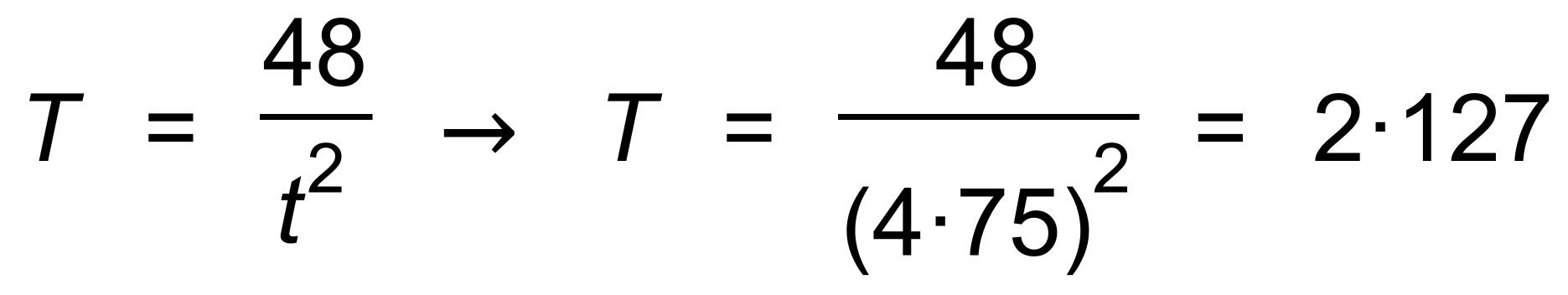
∴  ✓

(c) ** ✓

∴  ✓ [5]

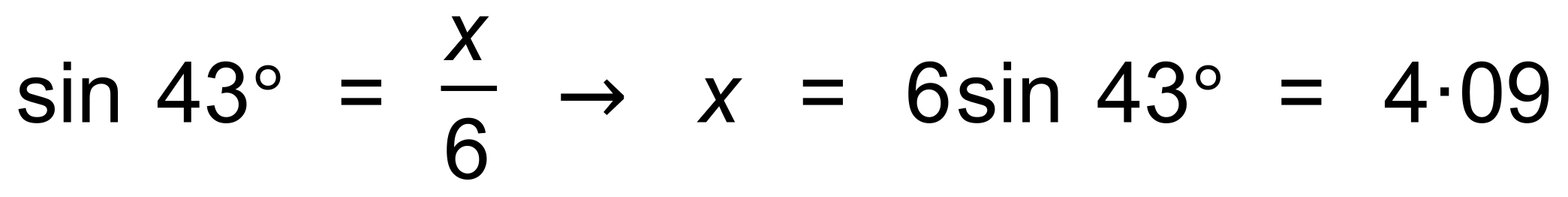
10. (a) (i)  ✓

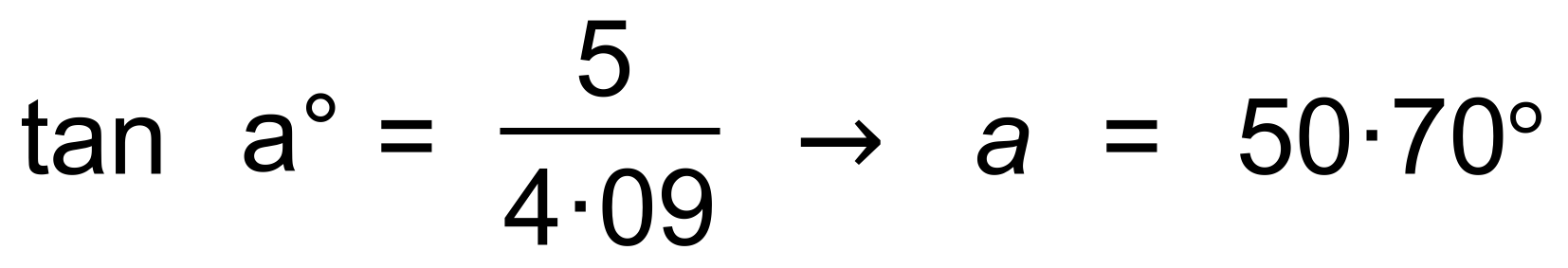
 ✓

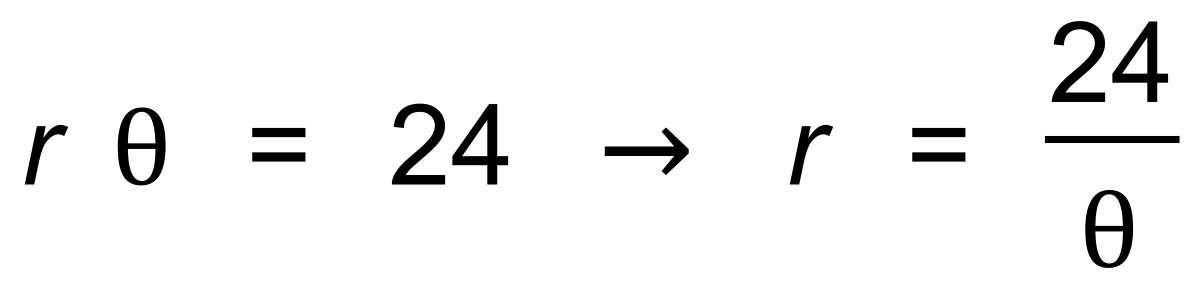
(ii) **  ✓

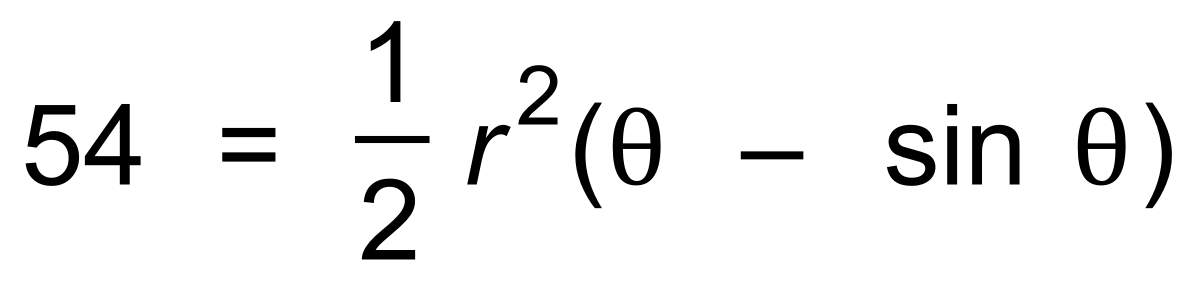
∴ Temperature is 2°C ✓

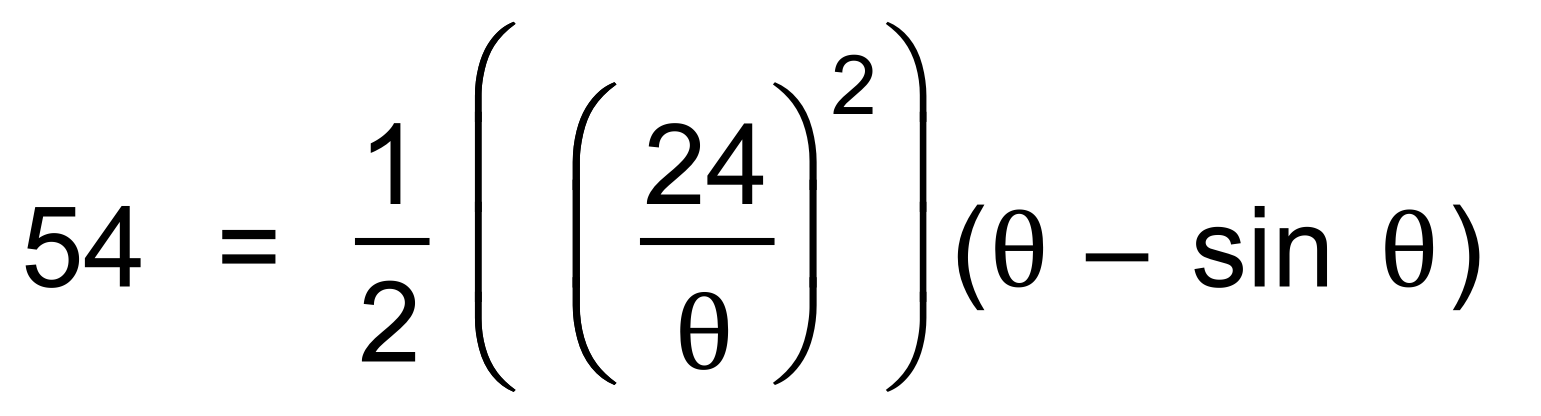
(b) D ✓ [5]

11. (a)  ✓

∴  ✓

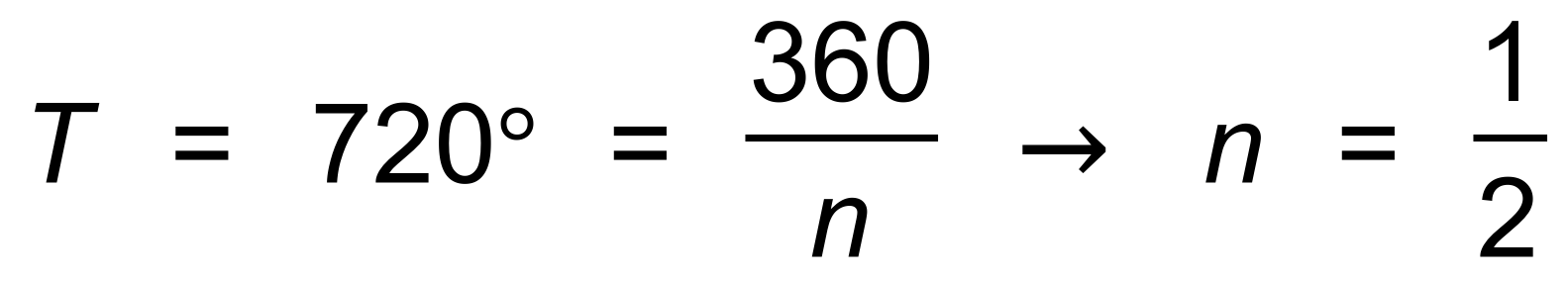
(b)  ✓

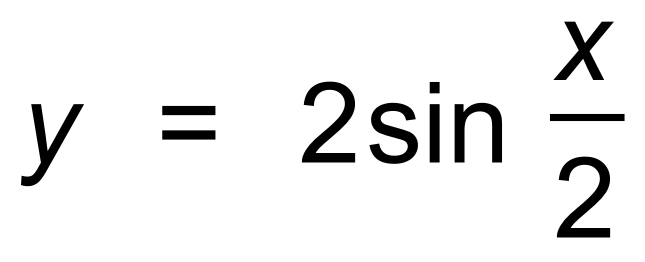
 ✓

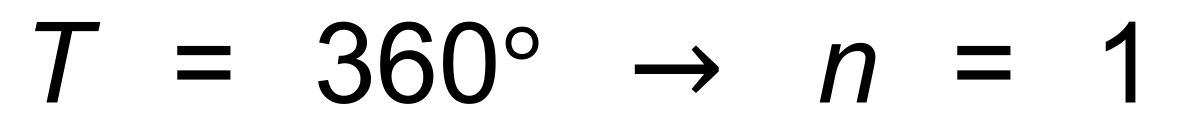
∴  ✓

∴ θ = 1.211 ✓

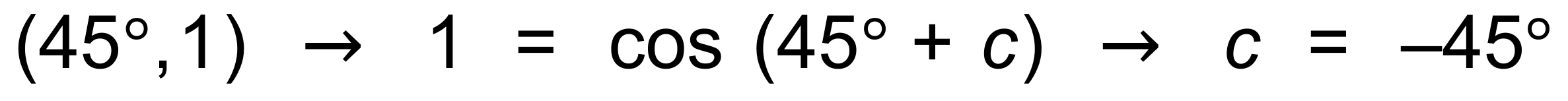
∴ r = 19.8 cm ✓ [7]

12. (a)  ✓

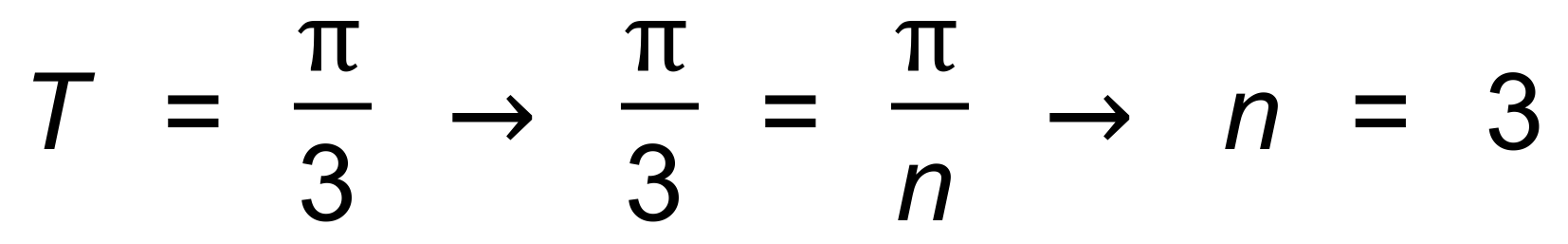
∴  ✓

(b)  ✓

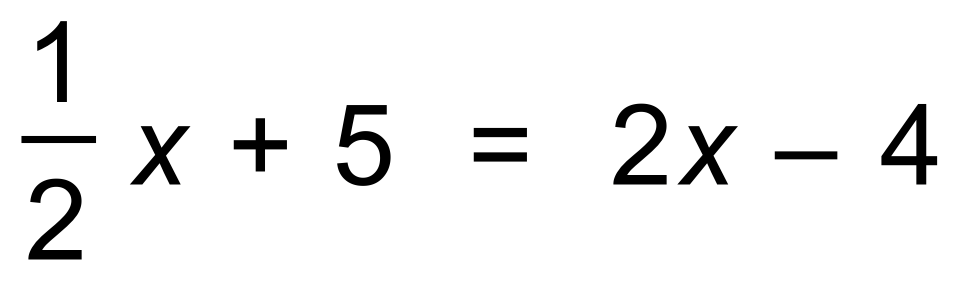
∴  ✓

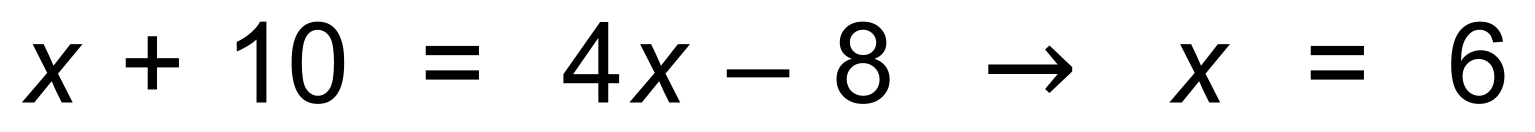
 ✓



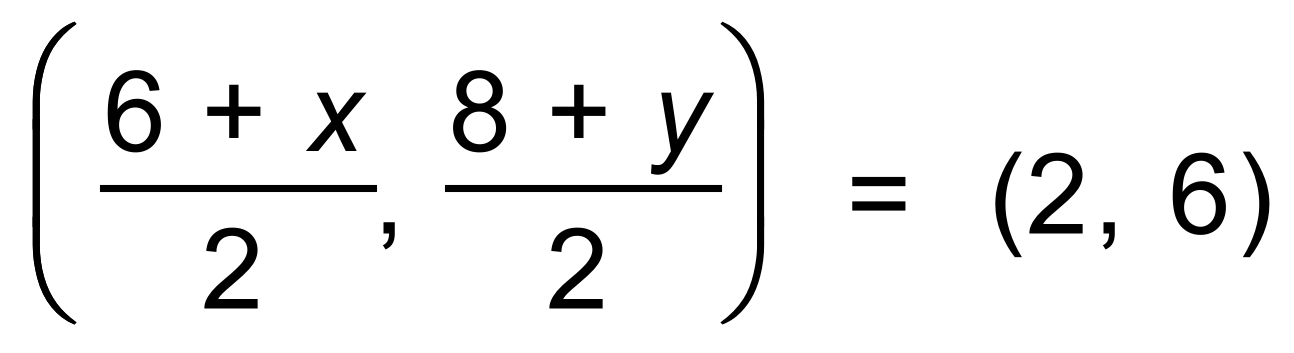
(c)  ✓

∴  ✓✓ [8]

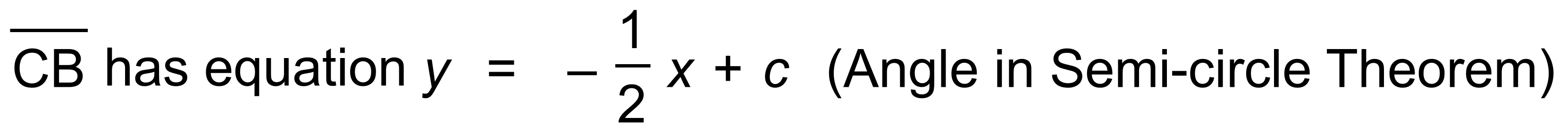
13. (a)  ✓

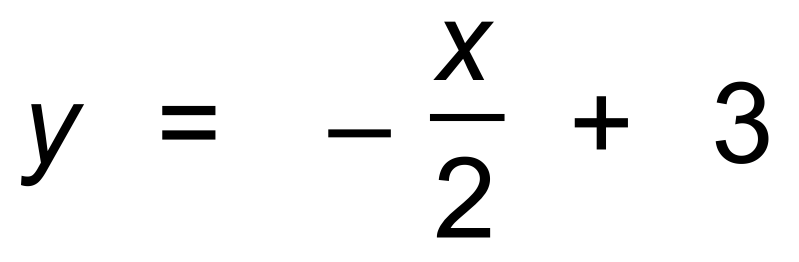
∴  ✓

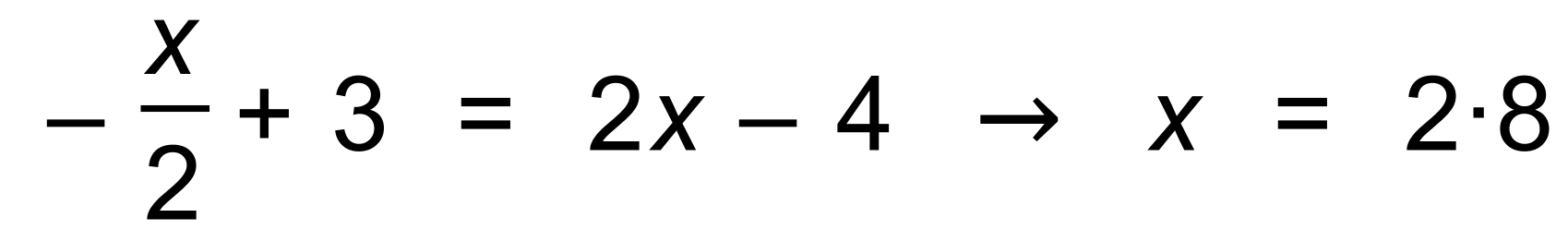
∴ A(6, 8) ✓

(b)  ✓

∴ B(−2, 4) ✓

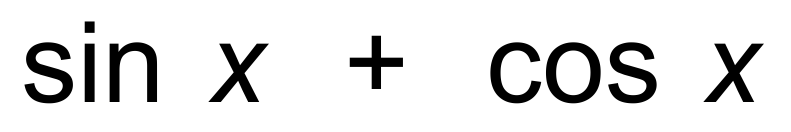
(c) 

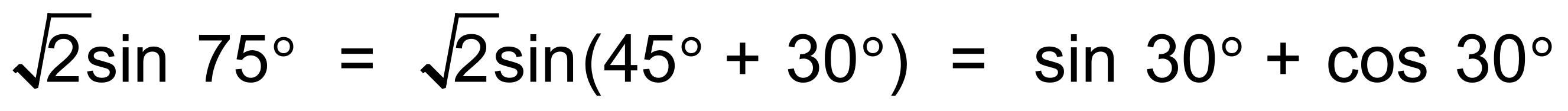
∴ (−2, 4) → *c* = 3 →  ✓

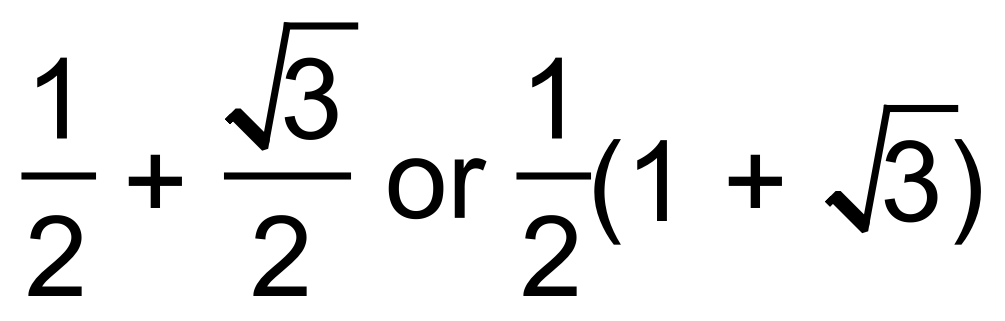
Hence  ✓

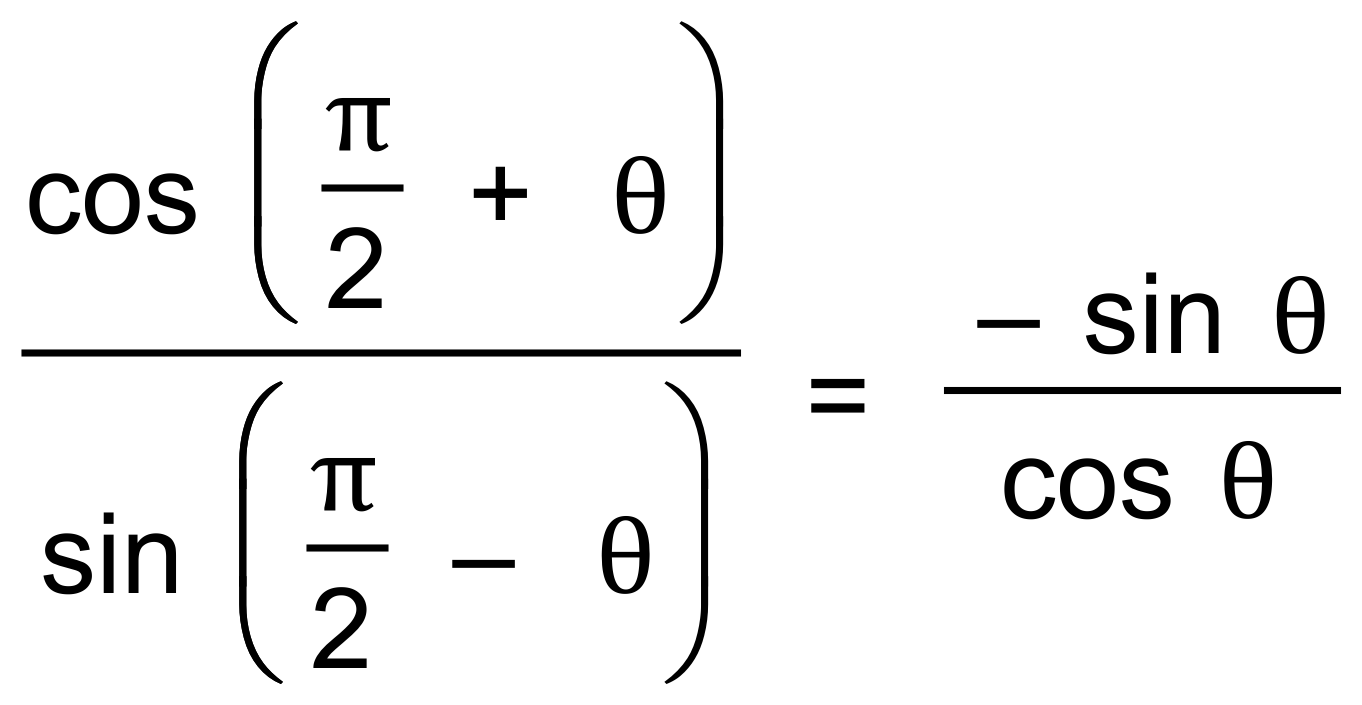
∴ C(2.8, 1.6) ✓ [8]

14. (a) (i)  ✓

=  ✓

(ii)  ✓

=  ✓

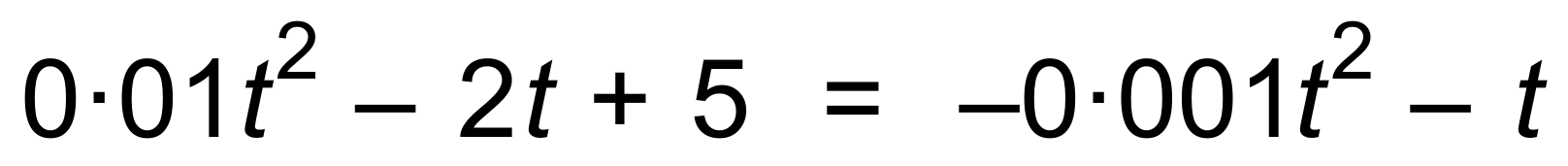
(b)  ✓

=  ✓ [6]

15. (a) It starts in section B. ✓

In section B, *h*(0) = 0 which is the initial height. ✓

(b) Section A = Section B when

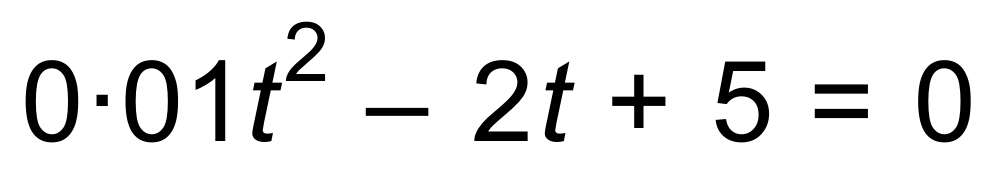
 ✓

∴ *t* = 5.3 seconds ✓

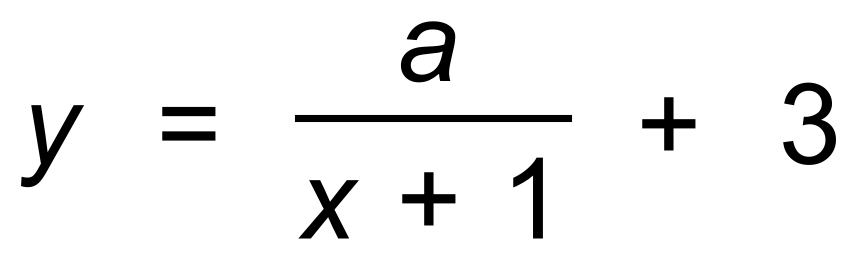
(c) Occurs when Section A has its minimum ✓

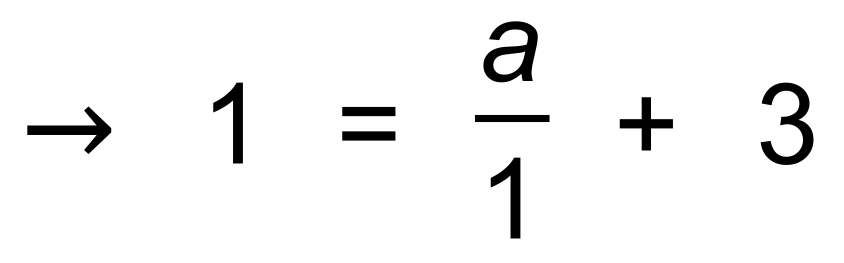
∴ *h* = 95 m ✓

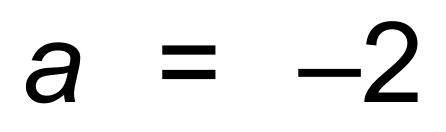
(d) Coaster back to height of zero when Section A = 0

 ✓

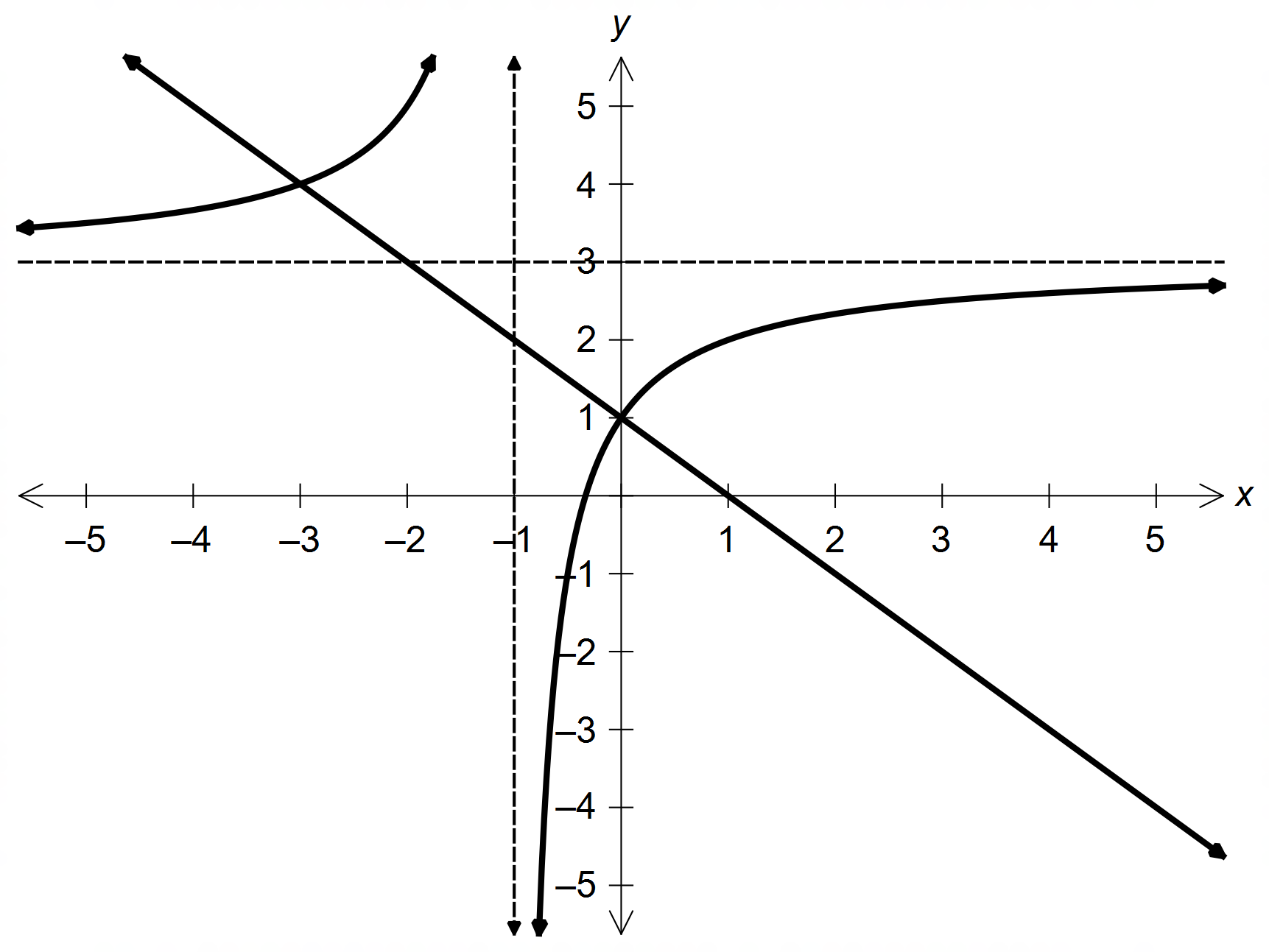
∴ *t* = 197 seconds ✓ [8]

16. (a)  ✓✓

∴ (0, 1)  ✓

∴  ✓

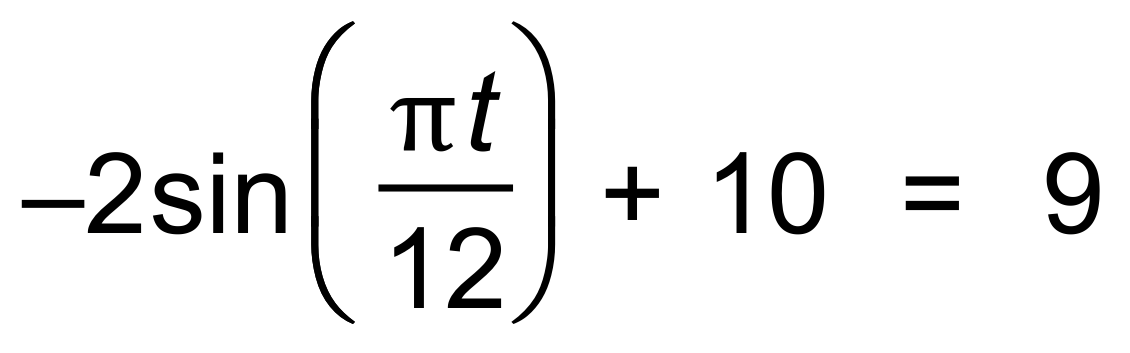
(b)



✓✓ [6]

17. (a) (i) 8.6 m ✓

(ii) *t* = 18 → 6 pm ✓

(b)  ✓

∴ *t* = 2 and *t* = 10 ✓

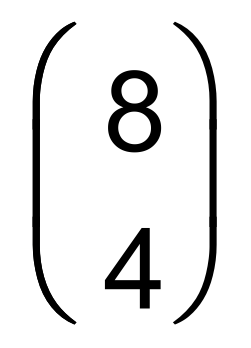
Hence between 2 am and 10 am. ✓ [5]

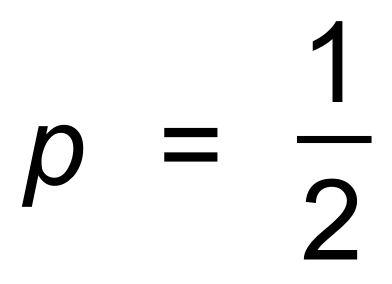
18. (a) *b* = 6

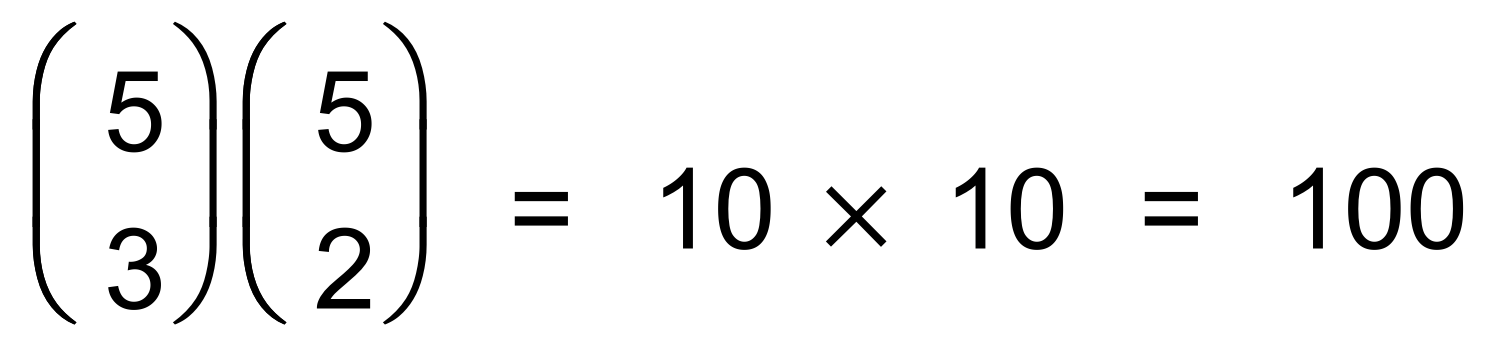
*f* = 10 ✓

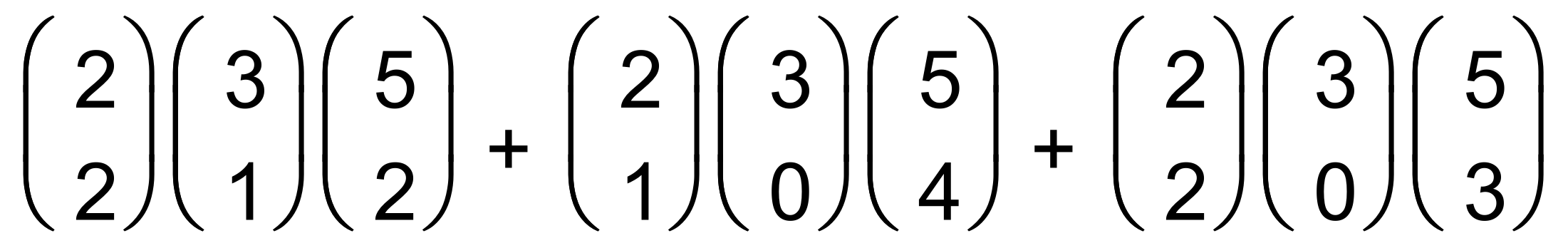
(b) *b* + *c* = *f* ✓

(c) 13 ✓

(d)  ✓

(e)  ✓✓ [6]

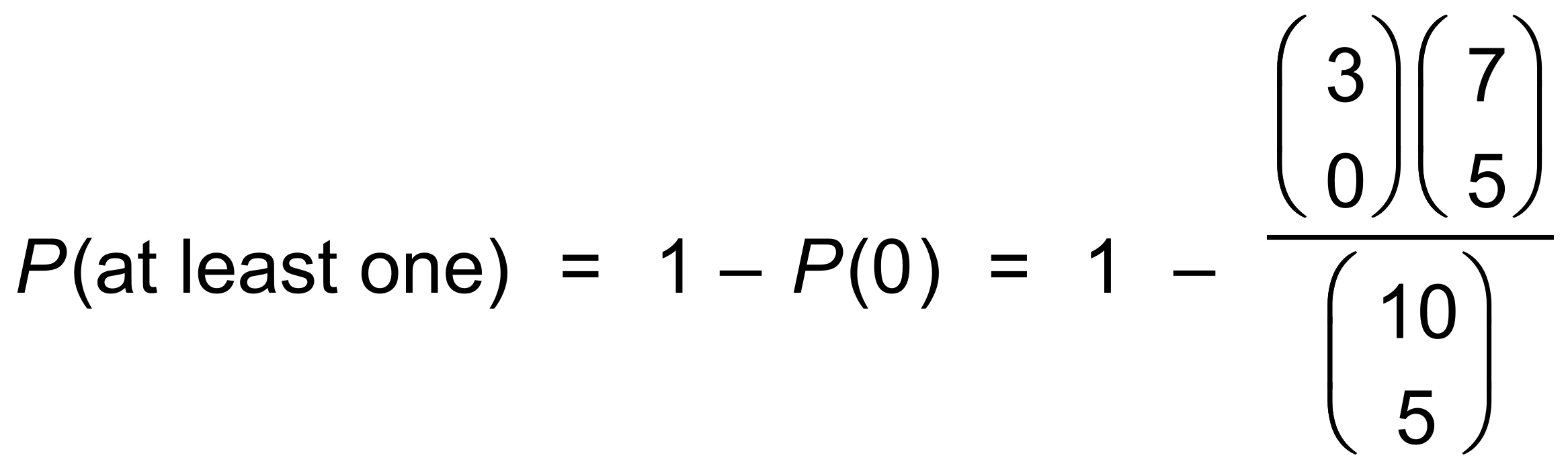
19. (a) (i)  ✓✓

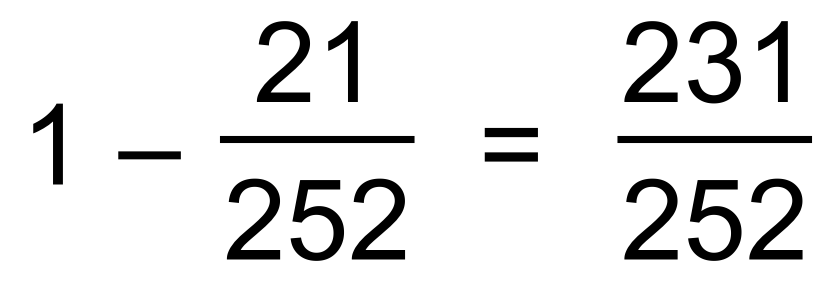
(ii)  ✓

= 30 + 10 + 10 = 50 ✓

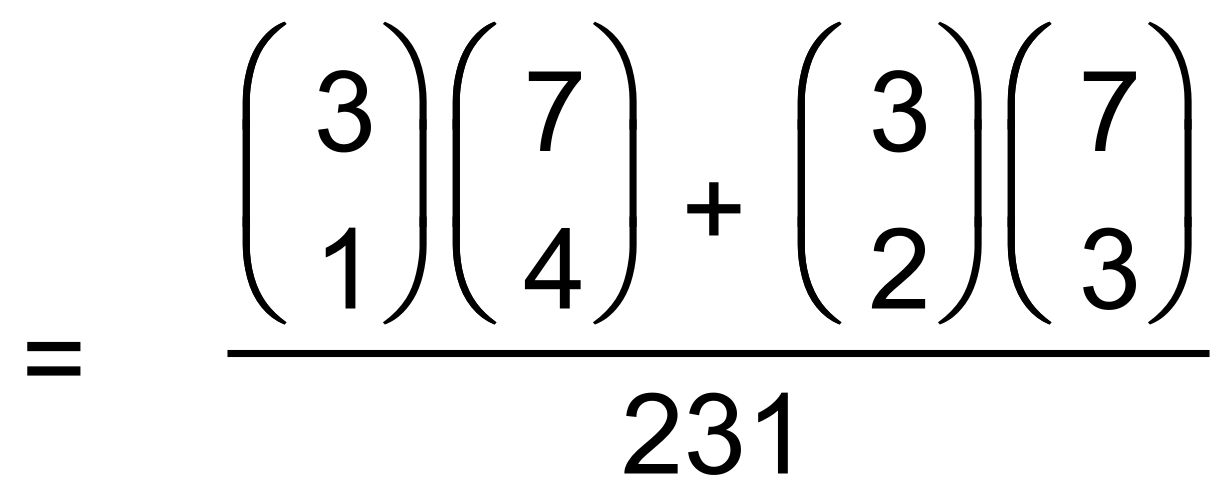
(b) How many different selections containing four blue pens ✓

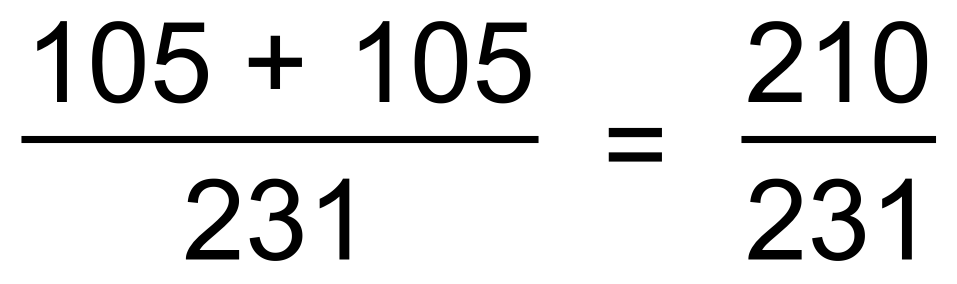
and a black pen are possible? ✓

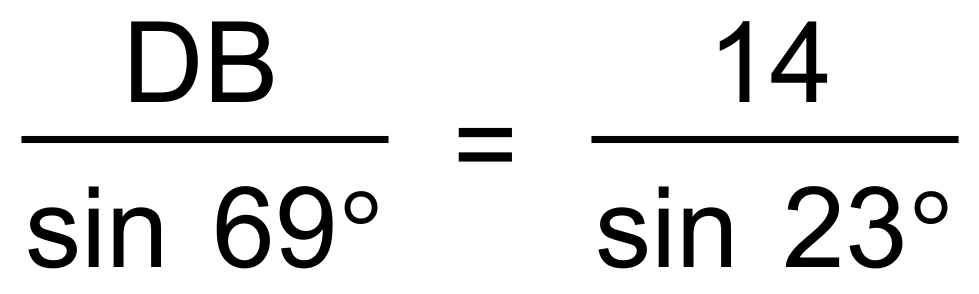
(c) (i)  ✓

=  ✓

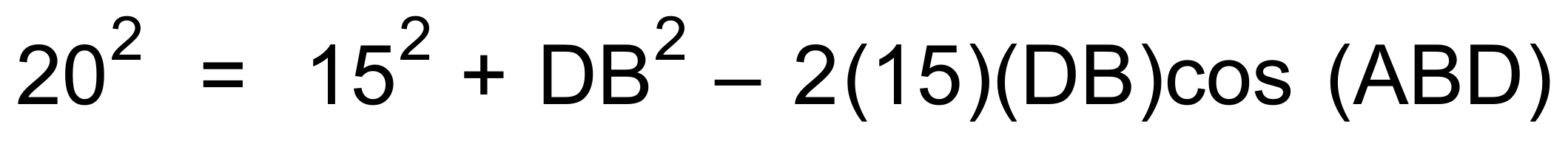
(ii) *P*(at most two red | at least one red)

** ✓

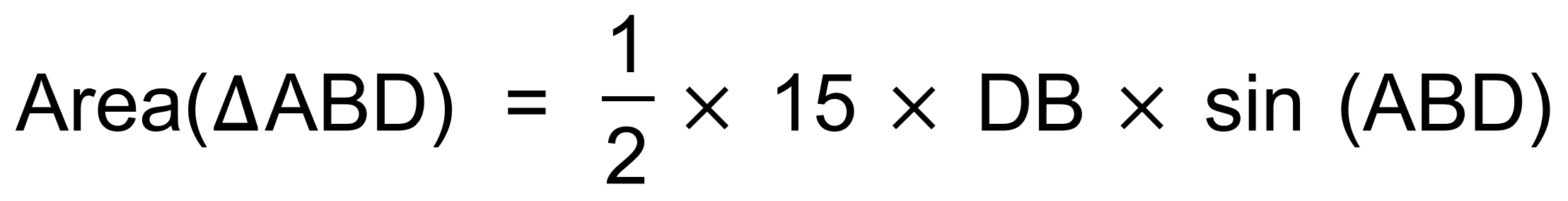
=  ✓ [10]

20. (a) (i)  ✓

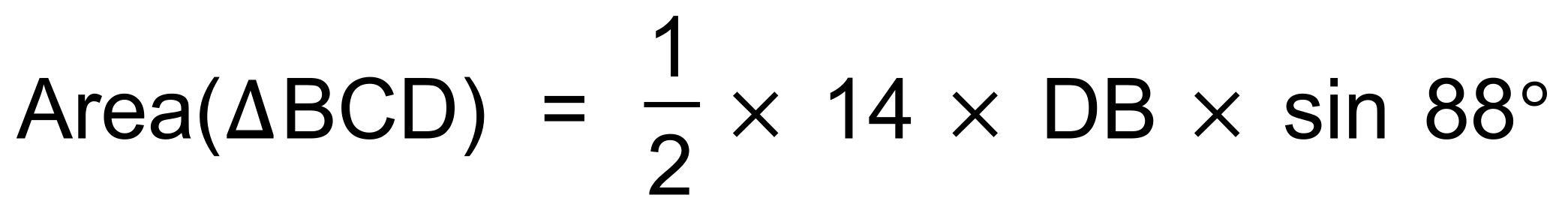
∴ DB = 33 m ✓

(ii)  ✓

∴ ∠ABD = 19.84° ✓

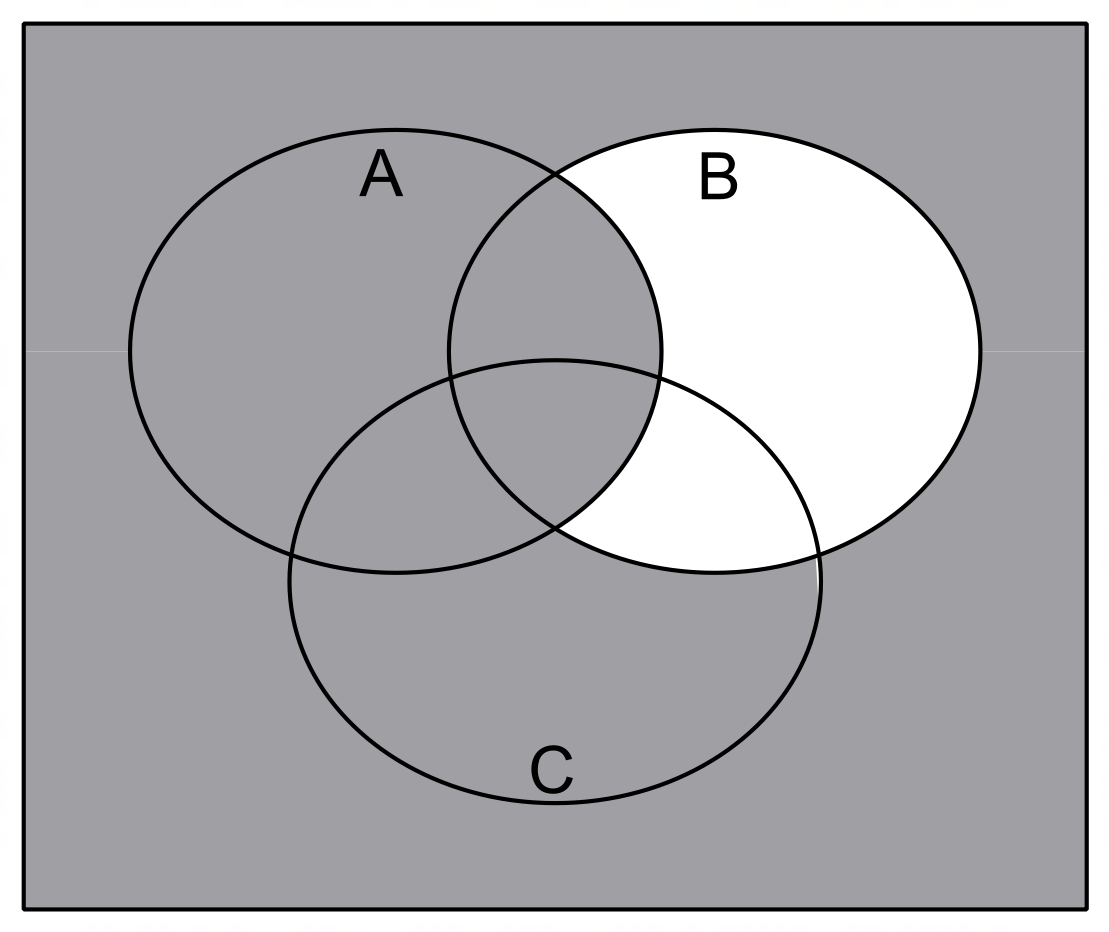
(b)  ✓

= 85.16 m2 ✓

 ✓

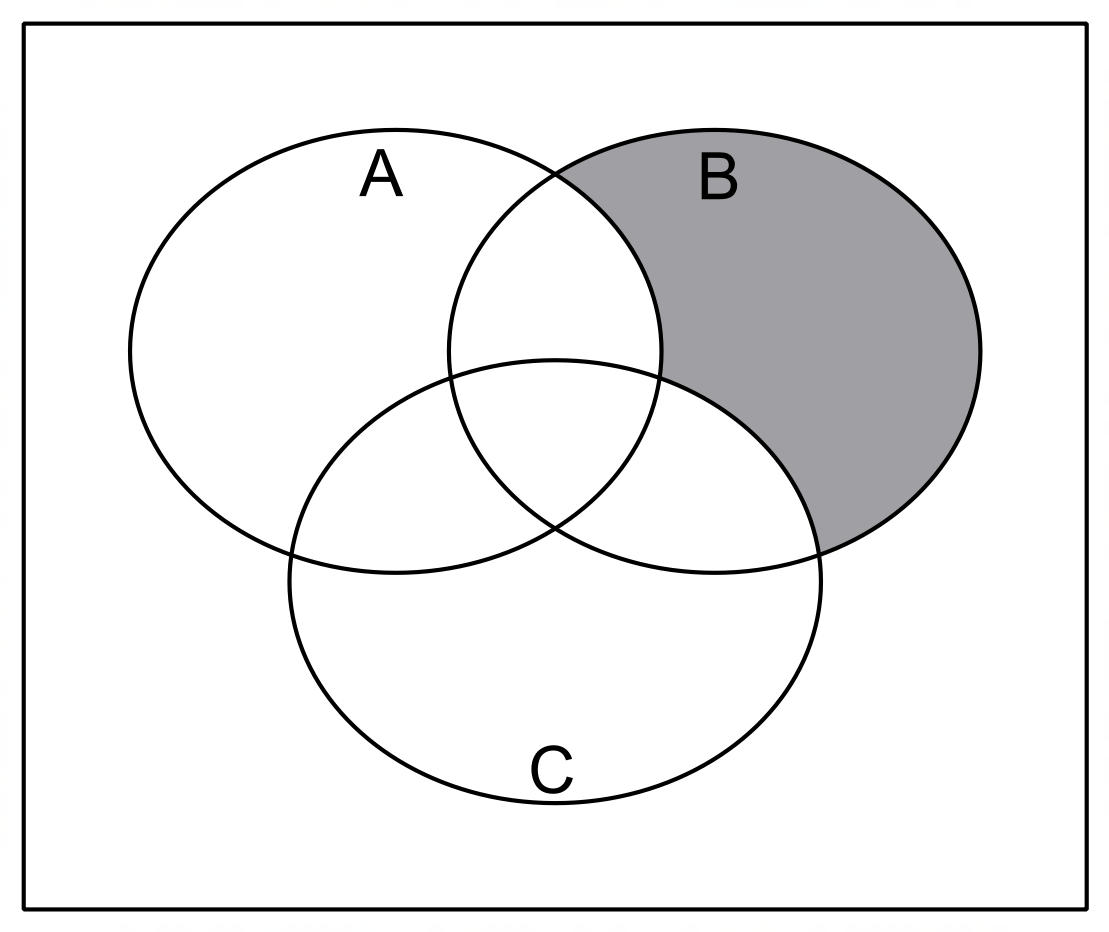
= 234.01 m2 ✓

∴ Total area = 319.17 m2 ✓ [7]

21. (a) (i)

✓✓

(ii)



✓✓

(b) E′ ∩ (D ∪ F) ✓✓ [6]

22. (a) P(L1) = 0.7, P(L2) = 0.35, P(L2|L1) = 0.35 and P(L3) = 0.4

Since P(L2) = P(L2|L1) = 0.35 ✓

then independent events. ✓

(b) (i) P(all three) = P(L1) x P(L2) x P(L3)

= 0.7 x 0.35 x 0.4 = 0.098 ✓✓

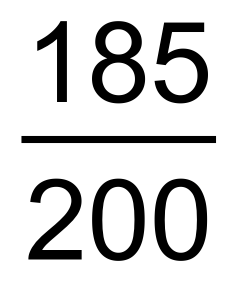
(ii) P(L1 ∪ L2) = P(L1) + P(L2) − P(L1 ∩ L2)

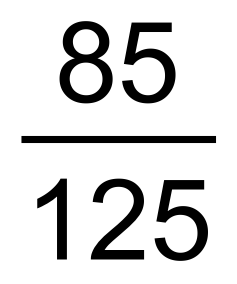
= 0.7 + 0.35 − 0.7 x 0.35 = 0.805 ✓✓

(iii) P((L1 ∪ L2 ∪ L3)′|L1′)

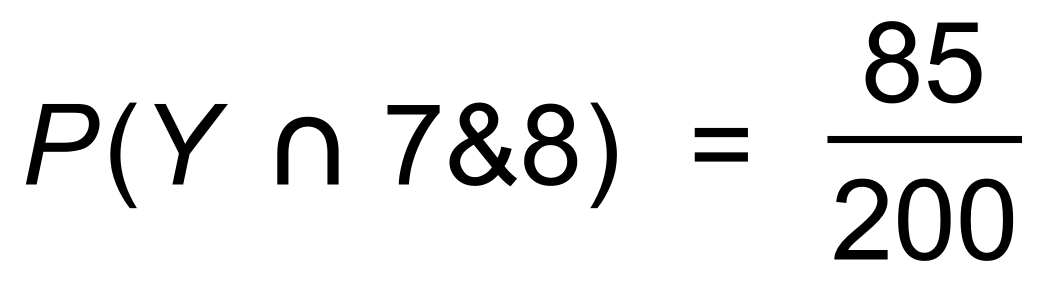
= P(L2′ ∪ L3′) ✓

= 0.65 + 0.6 − 0.65 x 0.6 = 0.86 ✓ [8]

23. (a) (i)  ✓

(ii)  ✓✓

(b) 

 ✓

Since P(Y) x P(7&8) ≠ P(Y ∩ 7&8) then not independent. ✓ [5]