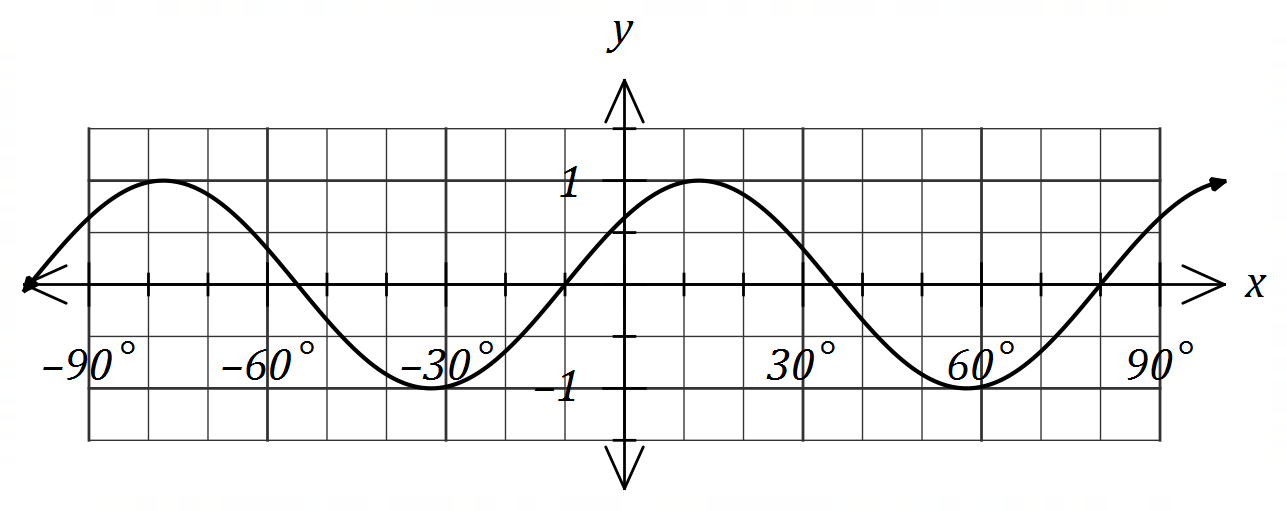
sin (A±B) = sin(A)cos(B) ± cos(A)sin(B)

**T1 x rn–1 = T0 x rn**

cos (A±B) = cos(A)cos(B) ∓ sin(A)sin(B)

tan (A±B) =

**The graph of is shown below, where and are positive constants.**



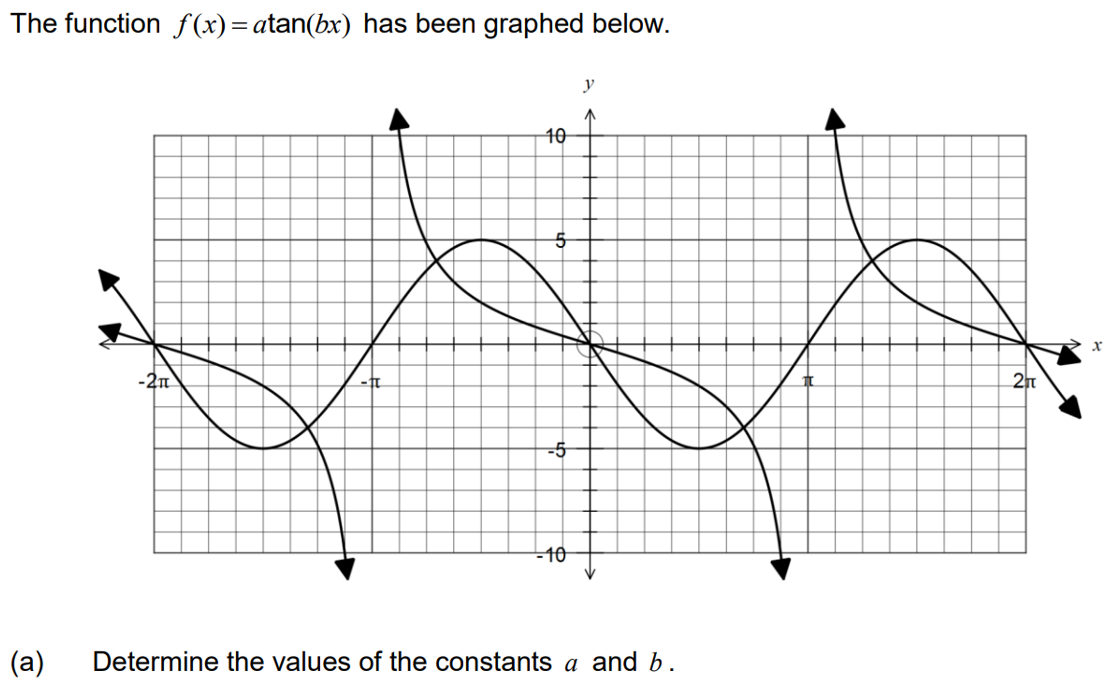
**Determine the minimum possible value of each of the constants.**

a = 4

= 10 → b = 40°

**Note: Use discriminant to prove there are no solutions if you can’t factorise.**

For tree diagram questions with “actually and “classified”, do “actually” and then “classified”.



b =

( , –2) → –2 = a tan( x )

–2 = a tan() → a = –2

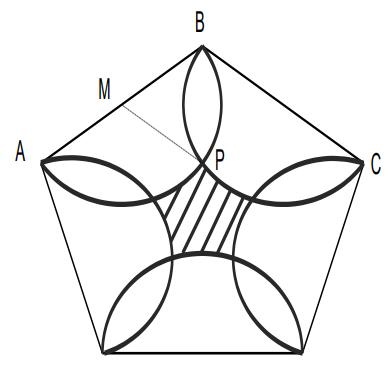
**OR**:

b =

( , –2) → –2 = a tan( x )

–2 = a tan() → a = 2

**The diagram shows five congruent semicircles standing on the inside of a regular pentagon with sides of length 20 cm. M is the midpoint of the side AB and P is the point of intersection of two semi-circles.**



θ

**a) Show that the size of angle ∠BMP = 72°.**

B

θ

2cm

2cm

C

M

P

r = BM = 2cm

θ = = 108°

∠BMP = = 72°

**b) Determine the area of the central shaded region.**

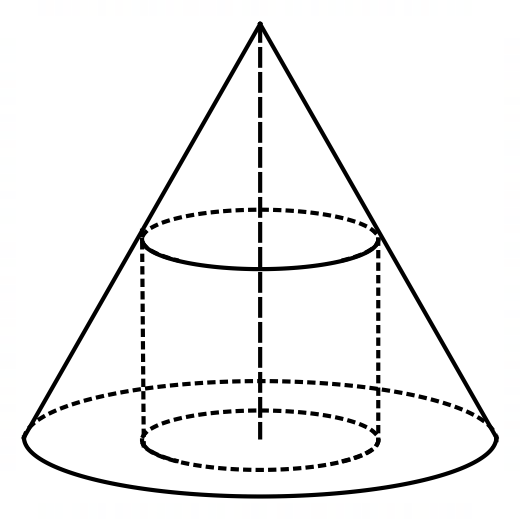
Area(1 segment) = (22) – (22)sin() = 0.611cm2

Area(semicircle) – area(4 segments) = 2 – 4(0.611) = 3.84cm2

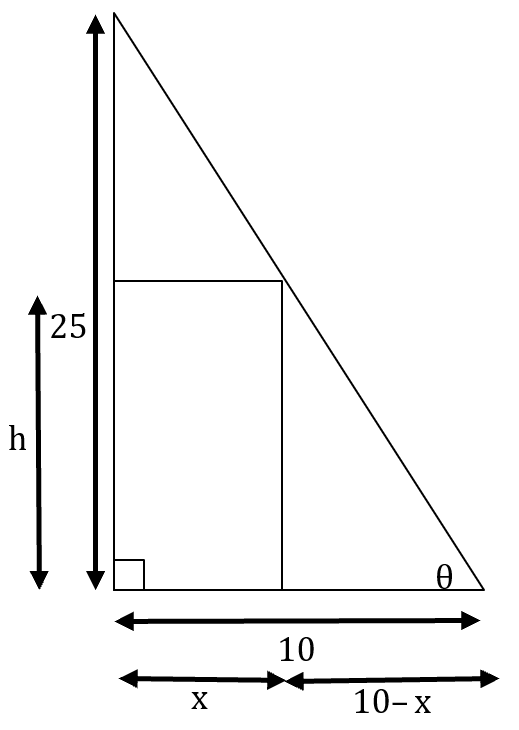
Area(pentagon) = = 247.75cm2

Area(shaded) = 247.75 – 5(3.84) – 5(0.611) = 225.50cm2

**A right circular cone of base radius cm and height cm stands on a horizontal surface. A cylinder of radius cm and volume cm3 stands inside the cone with its axis coincident with that of the cone and such that the cylinder touches the curved surface of the cone as shown.**

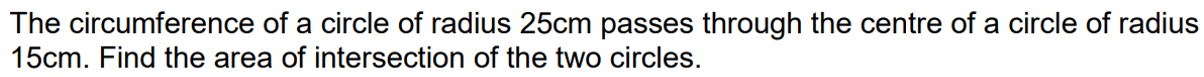


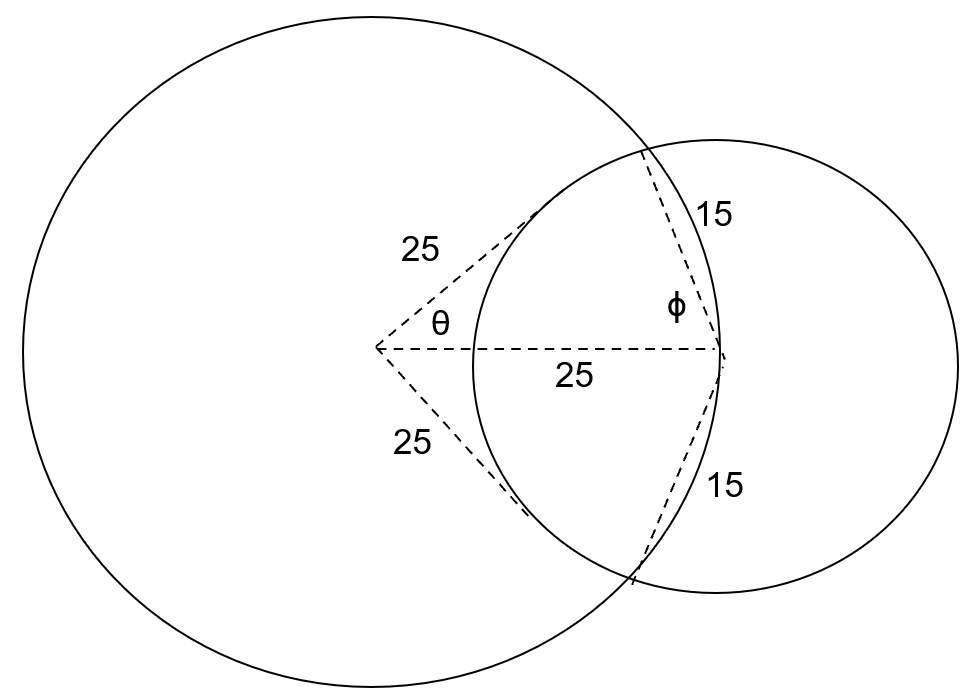
Show that .



tanθ = = → h = = = 25 – 2.5x

V = πx2h = πx2(250 – 2.5x) =





152 = 2(252) – 2(252)cosθ → θ = 0.609 radians → 2 x 0.609 = 1.219

A1 = (252)1.219 – (252)sin1.219 = 87.53cm2

252 = 152 + 252 – 2(15)(25)cosϕ → ϕ = 1.266 radians → 2 x 1.266 = 2.532

A2 = (152)2.532 – (152)sin2.532 = 367.47cm2

Area = A1 + A2 = 308.01cm2

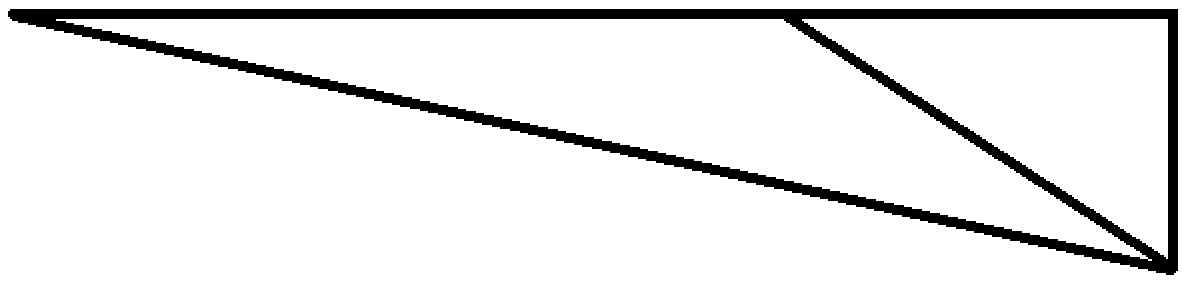
**A drone is flying in a straight line and at a constant height m above a level pitch towards a thin goal post. It maintains a constant speed of ms-1.**

**Initially, the angle of depression from the drone to the base of the post is . Exactly seconds later this angle has increased to .**

**a) Sketch a diagram to show the two angles of depression from the drone to the base of the post.**

z

13.5m



2°

170°

y

h

8°

10°

**b) Determine, showing all working, the value of and calculate the time after leaving its initial position that the drone will collide with the post.**

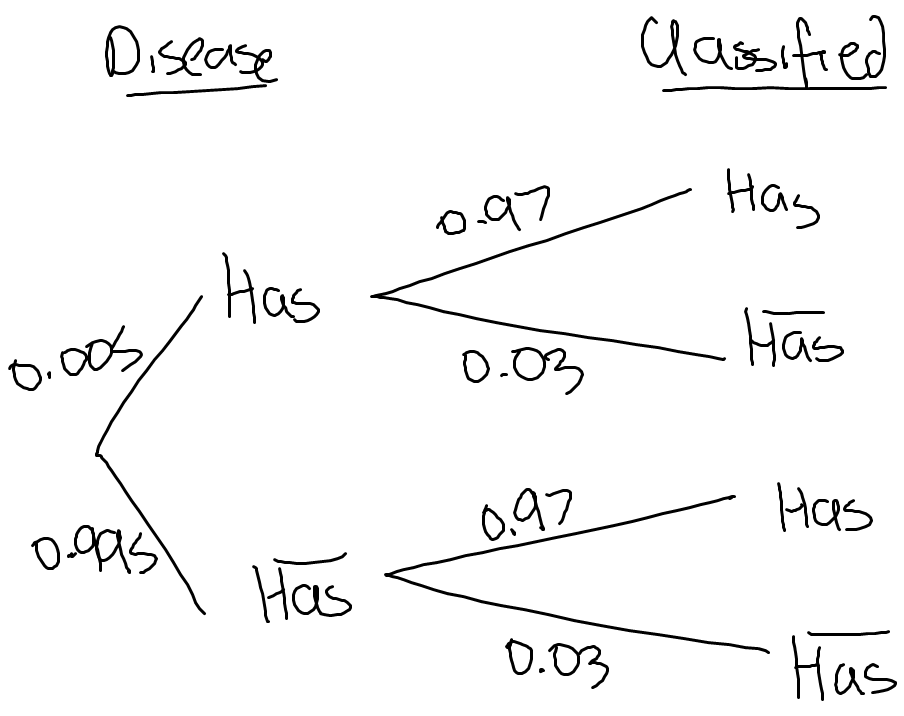
= → y = 53.84m

sin10 = → h = 9.35m

cos10 = → z = 53.02

t = 3 + = 14.78 seconds

**A diagnostic test for a disease has a chance of giving the correct outcome and it is known that of all sheep on a station have the disease. It can be assumed that the correct outcome of the test is independent of whether a sheep has the disease.**



**b) Two sheep are randomly selected for the test from those on the station. Determine the probability that just one of the sheep is diagnosed correctly.**

0.97 x 0.03 x 2 = 0.0582

**Line A and Line B in the x-y plane intersect at 90° at the origin. Line A has a slope of . Point (2,–6) is the midpoint of line segment CD which is parallel to Line A. Given that the x-value of C is –1, find the coordinates of point D.**

2 = → x = 5

= –6 → y2 + y1 = –12

= = = → y2 – y1 = 2

y2 + y1 = –12

P(D) = (5, –5)

2y2 = –10 🡪 y2 = –5

y2 – y1 = 2

Use gradient: = → y2 – y1 = 2 → –5 – y1 = 2 🡪 y1 = –7 → P(C) = (–1, 7)