3CD Mathematics Specialist WACE Revision

**Functions Exponentials Logarithms**

Questions are taken from VCE Secondary Papers

**2009**

Machine generated alternative text: Question 1
a. Diffeíeithate xlog,(x) with respect to x.

Machine generated alternative text: cos(x)
-‘
b. Foçfx)= i-2

Machine generated alternative text: Question 2
a. Find an anti-deñvative of 1 with respect to x.
1-2x

Machine generated alternative text: b. Evaluate +

Machine generated alternative text: Question 6
Oil is leaking at a constant tate to form a circuiar puddle ou the floor. The oil is being added to the puddle at the
rate of 10 mm3 per ¡mante causing the puddle to spread out evenly with constant depth of 2 mm.
When the radius of the puddle is r nm. the volume. Vmm. of oil in the puddle is given by V= 2xr2.
Find the rate of change of the radius of the puddle when the radius is 30 mut Give an exact answer, with units
of mni per minute.

Machine generated alternative text: Question 8
Letf:R —. R,flx)i—k. where k isareaim beíThetangenttothegraphoffatthepointwheíe x=a
passes through the point (O, O). Find the value of k in terms of a.

Machine generated alternative text: Question 9
Solve the equation 2 log0 (x) — 1og (x -t-3) = log0 for x.

**Answers**

Machine generated alternative text: , (2x1- 2)x—sm(x)—cos(x)x2
f(x)= .
(2x4-2y
f•(x)= 1
2Çr+1Y

 1a. Machine generated alternative text: X x.....4-1og8(x)
= 1+Log6(x) b.

Machine generated alternative text: ÇM+’»
= (— + 4)— (— + 1)
3 3
2 23
= 7—-—
33

2a. Machine generated alternative text: 1—2x1) b.

Machine generated alternative text: dV
— = 4ir
dr
dr drdV
dt d’ dr 4zr
whenr3O
dr 12z

6.

8. Machine generated alternative text: [(r) = ?, [(a) = so tangent isy = e°r
Then solve by using common y-values .rða A°), or common rathent e + k O =
a—O
both lead to ecz e’ + k
k = ¿a —ð = ¿(a —1)

Machine generated alternative text: (x2 Ii
log log. —
\x+3) 
x 1 .
—=—z2š =x+3
x+3 2
2x2 —x—30
Solve (ßctonzmg or by fezmu]a) to get z = or z = —l.
Since z must be positive. the answer is
3
X
,

9.

**More 2009**

Machine generated alternative text: b. On the set of axes above, sketch the graph of y (flx)I.Machine generated alternative text: Question 1
Let f: R u {0) - R. fix) = 6’jx - x-5.
The graph of y f(x) is shown below
X
V
y fix)
o
5 10
15
20
a. State the inteival for which the graph off is sthctly decreasing.

Machine generated alternative text: e. Points A and B ae the points of intersection of y =f(x) with the x-axis. Point A has coordinates (1,0) and
point B has coordinates (25, 0).
Find the length of AD such that the area of rectangle ABCD is equal to the area of the shaded region.
I I I
0 5 10 15 20

Machine generated alternative text: ii. Finda  [16.25]suchthatf’(a)=in(Exactvaluetobegwea)Machine generated alternative text: d. Tbe points P(16. 3) and 8(25.0) are labelled on the diagrant
y
3)
X
5
10
15
20
L Find m. the gradient of the chord PB. (Exact value to be givea)

Machine generated alternative text: n Henceshowthata=1.b—6andc=16.Machine generated alternative text: Question 2
A train is travelling at a constant speed of w kmh along a straight level track from M towards Q
The traiji will travel along a section of track Mi\PQ.
Section MN passes along a bridge over a valley.
Section v? passes through a tunnel in a mountain.
SectionPQis 6.2 km long.
From M to P. the curve of the valley and the mountain, directly below and above the train track, is modelled
by the graph of
y - bx2 + c) where a, b and e are real nbers
All measurenuts are in kilometres
a. The curve defined from M to P passes through N(2. 0). The gradient of the curve at N is -0.06 and the
curve has a turning point at x 4.
I. From this information wiite down three simultaneous equations in a, b and e.
direction of train
4

Machine generated alternative text: n thelengthofthetunnel Machine generated alternative text: b. Find. giving exact vahies
1. the coordinates of M and P

Machine generated alternative text: UI the marimI1m depth of the valley below the train tiack

Machine generated alternative text: n Hecesiowthatal.b—6andcl6.

Machine generated alternative text: The dgiver sees a large rock on the tnck at a point Q. 6.2 km from P. The driver puts on the brakes at the
instant that the front of the train comes out of the tunnel at P.
Fromitsinitialspeedof w bmb,thetrthnslowsdownfrompothtPsothatitsspeedvbnibisgivenby
(d÷1)
vklog,  ,
where d km is the distance of the front of the train from P and k is a real consta
e. Find the value of k inteims of w.

Machine generated alternative text: If v 1201og(2) wiien d2.5.findthevalueof w.
d. log,(7)

Machine generated alternative text: e. Find the exact distance from the front of the train to the laige rock ten the train finally stops.

Machine generated alternative text: Question 4
A Zambeji tribe has stolen a precious maiNe statue from Tasmania Jones. The statue has been tied to a rope
and is suspended so that its base is initially 6 metres above the top of a vat- The vat is an inverted right circular
corn with base radius 4 metres and height 8 ¡nettes.
At 9.00 am the tribe starts to lower the marble statue towards the vat at a tate of 1 nfle per hoix. At the same
time acid begins to be poured into the vat at a constant rate of in per hour The vat is initially empty When
the statue touches the acid, it win start to dissolve.
At time t hours after 9.00 am. the height of acid in the vat is h metres and the radius of the suthce of the acid
in the vat is rmetres.
L g. Showthath=2r.
t
position of base of statue
6m
base of statue
acid -k
8m

Machine generated alternative text: ii. Hence find an expression for t) vohune of acid in the vat at time t. in te’zms of h.

Machine generated alternative text: b. Show that the rate at tich the light of the acid is increasing. is ineties per hour.

Machine generated alternative text: u the height of the acid when it is increasing at half the rate found Inc. j.Machine generated alternative text: e. Find. giving exact values
1. the rate at which the height of the acid is increasing when its height is 2 metres

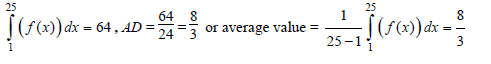
Machine generated alternative text: n Hence find an expression for the height of the acid in ternis of f. Machine generated alternative text: d. L Write an expression for in teim of h.

Machine generated alternative text: n At diat tin would the stame firs.1 touch the acid? Machine generated alternative text: Taqrniii Jones will try to save the statue.
e. i. Write an expression for the distance of the base of the statue above ground level t hours after
9.00 am. (The vertex of the cone. O. is at ground level.)

**Answers**

Machine generated alternative text: f’(x) = 0, x = 9. [9. c) The interval for which the graph is strictly decreasing is whenJ(b) <f(a) for b> a and
a. beR.1a.

Machine generated alternative text: /
U lb 25 501b.



1c.

Machine generated alternative text: 1 81
f (a) = — , a =Machine generated alternative text: 3—0 1
m-1625 =—j

1d. i. ii.

Machine generated alternative text: I 6x—x2—5, forxO
flg(x)) = — —5 or f(g(x)) = 6xI — 5 or f(g(x)) = 1 2 were acceptable equivalent
—6x—x —5,forx<O
forms.

Machine generated alternative text: o —0.06
200 200 2002. a. i.

Machine generated alternative text: (3) —(2), 3a =3, a=1.Substitute a=1 into(2), 3+b=—ìb=—&
Substitute a=1 and b=—6 into(1). O=8—24+c, c=16. ii.

Machine generated alternative text: P (2—2h,O),šf (2+2J,O)

b. i.

Machine generated alternative text: 2’.5 kin

ii.

Machine generated alternative text: ,
—= 0.08 ktu 80m
25

iii.

Machine generated alternative text: W W
k= 1oe) =•1og(7)

c.

Machine generated alternative text: l2Olog(2) xloE 120
log0(7) 1oe() .‘

d.

Machine generated alternative text: 120
,log8I d6km
(1 7}
lOej4_)
Distance from Q = 62 —6 = 0.2 km

e.

Machine generated alternative text: Bysimilartriangles. >h2r

4. a. i.

Machine generated alternative text: 1 , h th3
V=rh,r==’ V=jT

ii.

Machine generated alternative text: dh dh dv 9ìr 4 9
—=—X—=—X---Th-= T
df dv dt 4 ìy

b.

Machine generated alternative text: Whenh2. 4 rn/h

c. i.

Machine generated alternative text: dli 99 9 ‚—
When  2q2m

ii.

Machine generated alternative text: df h2
dh 9

d. i.

Machine generated alternative text: 7 1
h h3 h3 —
t=Ç—dh = ±c,whenh=O,t=O.sot=, h=3t3

ii.

Machine generated alternative text: Height of statue above around level = 14 — t

e. i.

Machine generated alternative text: 14 — t = 3t”3,  t = 8 or 5.00 pm

ii.

**2008**

Machine generated alternative text: Question 1
a. Let y = (3x2 — 5x)5. Find
. dï

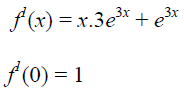
Machine generated alternative text: b. Letf(x) = xe-3’. Evaluatef’(O).

Machine generated alternative text: Question 5
The aiea of the region bounded by the v-axis, the x-axis, the curve y = e?x and the line x = C, where C is a
positive real constant, is Find C.

**Answers**

Machine generated alternative text: thenf’(x) = 5(6x — 5)(3x2 — 5x)4

1. a.



b.

Machine generated alternative text: rC  5
I edx=—
JO 2
F!e2xlC 5
L2 J 0 2
e2C —1 = 5
c=-1(oç (6) or (o (/)
e

5.

Machine generated alternative text: Question 2
The diagram below shows part of the graph of the fùnction f: F —> R, f(x) = —
V
o
The line segment Cl is drawn from the point «1, f(i)) to the point A(a, f(a)) where a> 1
a. i. Calculate the gradient of Cl in tenus of a.
b 1 a

Machine generated alternative text: ii. At what value of x between 1 and a does the tangent to the graph off have the same gradient as
CA?

Machine generated alternative text: b. î. Calculate f f(x)dx.

Machine generated alternative text: ii. Let b be a positive real number less than one Find the exact value of b such that f f(x)dx is equal
to7. b

Machine generated alternative text: 

Machine generated alternative text: ii. For what exact value of a does this area equal 7?Machine generated alternative text: c. i. Express the area of the region bounded by the line segment CA, the x-axis, the line x = 1 and the line
x = a in ternis of a.

Machine generated alternative text: iii. Using the value for a determined in c.ii.. explain in words, without evaluating the integral.
why Jf(x)dx < L
Use this result to explain why a < e.

Machine generated alternative text: ni
d. Find the exact values of m and n such that Jf(x)dx = 3 and Jf(x)dx = 2.

Machine generated alternative text: Question 3
Tasmania Jones is in the jungle. digging for gold. He finds the gold at Xwhich is 3 km from a point .4.
Point A is on a straight beach.
Tasmaau&s camp is at Y which is 3 km from a point if Point B is also on the straight beach.
.4B= 18 ndflh=BxkmandAXBY= 3km.
gold Tasmaniis canip
X r
3km jungle 3km
________ 1 ‘j L” r __________________
A xkni M beach N xkm B
18km
While he is digging up the golt Tasmania is bitten by a snake stich injects toxin into his blood. After he is
bitten. the concentration of the toxin in his bloodstream increases over time according to the equation
y501og/l+2r)
where y is the concentration, and t is the time in hours after the snake bites hint
The toxin n1l kill him il its concentration reaches 100.
a. Find the time. to the nearest minute. that Tasmania has to find an antidote (that is. a cure for the toxin).

Machine generated alternative text: Tanma has an antidote to the toxin at his canlp He can nm through the jungle at 5 haili and he can nm along
the beach at 13 knk
b. Show that he will flot get the antidote in time if he runs directly to his camp through the jungle.

Machine generated alternative text: In ordez to get the antidote. Tasmania nm through the jungle to Mon the beach, runs along the beach to Nand
then nais through the jungle to the camp at i Mis x Irni from A and Nis x km from B. (See diagran)
e. Show that the time taken to reach the camp. T hours, is given by
T=2
5 13

Machine generated alternative text: d. Find the value of x thith allows Tasmania to get to his camp in the minimum tinie

Machine generated alternative text: e. Show that he gets to his camp in time to get the antidote.

Machine generated alternative text: At his camp. Tasmania Jones takes a capsule containing 16 units of antidote to the toxin After taking the capsule
the quantity of antidote in bis body decreases over túne.
At exactly the saine time on successive days. he takes another capsule containing 16 units of antidote and again
the quantity of antidote decreases in his body
The graph of the quantity of antidote = units in his body at time d days after taking the first capsule looks like
this. Each section of the cuive has exactly the same shape as curve AB.
A
. .
0 1 2 3 4
The equation of the curve AB is : =
f. Write down the coordinates of the points A and C.

Machine generated alternative text: g. Find the equation of the curve CD.

Machine generated alternative text: Tasmania will no longer be affected by the snake toxin dieu be first has 50 units of the antidote in bis body.
h. Assuming he takes a capsule at the saine time each day on how many days does he need to take a capsule
so that be iU no lonaer be affected by the snake toxin’

**Answers**

Machine generated alternative text: 7
f(a)-f(L) = = 7
a—1 a—1 a

2. a. i.

Machine generated alternative text: 4v •7 7 !—
— = = ——, X = Ja , as X> 1
dx  a

ii.

Machine generated alternative text: f flxdx = 7

b. i.



ii.

Machine generated alternative text: =!(7+1)(_1)  7a2_1,
Area = Ae • A = --(a — 1)(7 — + Z(a —1)
7 7 \ 7(a2 —1)
Artia
1 a a 2a

c. i.

Machine generated alternative text: 7(a2_1)7JE+i
2a

ii.

Machine generated alternative text: a s
The area under the curve is 1es than the area of the trapezwm Hence Jf(x)dx < 7 From bi. Jf(x)dx = 7but
1 1
¡f (x)dx < 7. so a :: e.2. c. iii.

Machine generated alternative text: I I I I

d.

3. a. Machine generated alternative text: loo = 5Olog(l + 2t), t 31945 h = 192 mmute. to the nearetmmute

Machine generated alternative text:  b.

Machine generated alternative text: Time(AM = 4(9 + x2) = Time(N); Time(šß = 1S—2x
r=9Ì+182x =2Ç+.Z!)

c.

d. Machine generated alternative text: 1.25 km
dx

e. Machine generated alternative text: Whenx 125, T 2.492. 2.492 h < 3.19 h. Theiefore. he gets the antidote in time.

Machine generated alternative text: 4=(O, 16) C= (1. 24) f.

Machine generated alternative text: 

g.

Machine generated alternative text:  h.

**2009**

Machine generated alternative text: . . dv.
b. Frnd an expression for m terms of x, y and k.Machine generated alternative text: Question 5
Consider the fanui.ly of curves defined by the relation 3x3 — + kv + 5y — 2.xy =4 where k  R.
a. Verify that every curve in the family passes through the point (0,4), and find the other point of intersection
with the v-axis.

Machine generated alternative text: e. Hence evaluate the gradient of the curve at the point (1, 1).

Machine generated alternative text: Question 7
A mass has acceleration a m.s2 given by a = V2 — 3, where y m1 is the velocity of the mass when it has a
displacement of x metres from the origim
Find y in ternis of x given that y = —2 where x = 1.

**Answers**

Machine generated alternative text: dv
— = —6
th

5. a. Machine generated alternative text:  c.

Machine generated alternative text: dv 2y—9x2 —k
dx 5—2v—2x

b.

Machine generated alternative text: I 2—
v=—’Je +3

7.

**2009**

Machine generated alternative text: Question 1
A car accelerates from rest at traffic light A to a velocity of 27 ms’ in nine seconds. During this period of
acceleration its velocity y ins4 after t seconds, is given by
for Ost9
The ca then travels at a constant velocity of 27 ins4 for another thirty seconds, and finally decelerates until it
comes to rest at traffic light B. During deceleration its velocity y znC is given by
v=27cos(,(t_39)) for 39štS51
a. On the axes below. chaw a velocity—time graph i4tich shows the motion of the car as it travels from traffic
light A to traffic hght B.
y
lO 20 30 40 50

Machine generated alternative text: b. Calculate the distance travelled by the c duzing the &st nine seconds of its motion

Machine generated alternative text: e. Calculate. couect to the neazest 01 ni. the distance travelled by the car while it is decelerating.

Machine generated alternative text: d. Calculate. conect to the nearest O1 ms1. the average speed of the car as it travels from traffic light A to
affic liait B.

Machine generated alternative text: The speed Limit on this road is f m&4 (80 kilometres per hour).
e. Find the time interval t1 <t< t2 for’tich the car exceeds the speed limit.
Give yoiu answers for t1 and t2 correct to the nearest 0.1 seconds

Machine generated alternative text: Just as the cai begins to acceleíate away from traffic light A. a motorcycle travelling at a constant 20 zns1
passes the car.
f. Find the tine. conect to the nearest 0.1 seconds, and the distance. conect to the nearest metre. for the car
to overtake the motorcycle.

Machine generated alternative text: Question $
Scientists use a pressure sensitive device which measures depths as it sinks toward the sea bed. The device of
mass 2 kg is released from rest at the ocean’s s’uthce and as it sinks in a veitical line, the water exerts a resistance
of 4v newtons to its motion, where y ins1 is the velocity of the device t seconds after release.
a. Draw a diagram showing the forces acting on the device, and show that a = g — 2v, where a ins’2 is the
acceleration of the device when its velocity isv ms”1.

Machine generated alternative text: b. Henceusecalculustoshowthat t=O.51oj g
g—2v

Machine generated alternative text: c down the liniiting (tenninal) velocity of the devtce

Machine generated alternative text: d. How many seconds after its release is the velocity of the device - m.c?
Give yow answer in the exact form log,(a) where a is a positive real number.

Machine generated alternative text: At a particular location the device is released from rest at the suiface of the ocean
. . g -2t
The relation given in part b. may be reamanged to y = -(1 — e .
e. lithe device takes 180 seconds to hit the sea beti how deep is the ocean at that location?
Give your answer correct to the nearest metre.

Machine generated alternative text: f. Detennine the depth at which the velocity of the device is m.s4
Give your answer correct to the nearest tenth of a metre.

Machine generated alternative text: The device is released from a boat at a different location. At the instant of release. the boat begins to move away
from the device in a hoiizontal straight line at a constant velocity of 2  The device falls 1200m vertically
andhits the seabed.
g. Find the distance from the boat to the device when it hits the sea bed.
Give your answer correct to the nearest metre.

**Answers**

Machine generated alternative text: e,,,, ,..,—4.,.., ,,.e, ,4—j..ô—,—,-4 •
o 10 30

1. a.

Machine generated alternative text: Çt2dt =97.2rn

b.

Machine generated alternative text: 1 27 cos((t — 39) dt = 2063 n coffect to the nearest 0.1 m
24 )

1. c.

Machine generated alternative text: 21.8 ms’. correct to the nearest 0.1 ms’

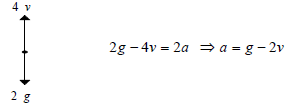
d.

Machine generated alternative text: =  2 = 43.6. correct to the nearest 0.1 s

e.

Machine generated alternative text: 97.2+(t—9)x27=20t t=2O.8s.distance417rn

f.



5. a.

Machine generated alternative text: 1 = —O.51og(g—2v)+c. t=O.v=O c=O5log0g and so t=O.51ogg—O.51og(g—2v)
dv g—2v
which gives the stated result.

b.

Machine generated alternative text: 

c.

Machine generated alternative text: 1ogsJ5 S

d.

Machine generated alternative text: !. (i — e2’ )d = 880 in. correct to the nearest in

e.

Machine generated alternative text: dv g3 
— = g — 2v, x = f dv = Li ni. correct to the nearest 0.1 m
dx 0g—2v

f.

Machine generated alternative text: 1200 = ejdt or 1200 = ± O.5e_2t)_ gives 245A seconds for the device to fall 1200 ni
2 4
distance = 1 2002 ± ( 245.4 x 2)2 = 1 296 ni. correct to the nearest in

g.

**2008**

Machine generated alternative text: Question 2
Given the telation 3x2 + 2y+)2 = 11. flndthe gradient of the normal to the graph of the relation at thepouit
in the first quadrant where x =1.

Machine generated alternative text: Question 5
Apartide moves in a straight line so that at time t seconds. it has acceleration a ¡ns2. velocityv fis and position
x ¡n relative to a fixed point on the line. The velocity and position of the particle at anytime t seconds aie related
by y = —x Initially x = 1.
a. Find the initial acceleration of the particle

Machine generated alternative text: b. Expes x in ternis oft.

Machine generated alternative text: Question 6 .
The cuie th equation 1 flx) passes through the point P(j 2) and has a gmdient of-i at this point
Find the exact adieiit of the curve at x = given that f”(x) = -sec2(2x)

Machine generated alternative text: Question 9
The graph of y = cos1 (x). x  [—1. 11 is shown below
1’

Machine generated alternative text: Find the aiea bounded by the graph shoi above. the x-axts and the line with equation x = —1

**Answers**

Machine generated alternative text: 

2.

Machine generated alternative text: 5. a.

Machine generated alternative text: 

b.

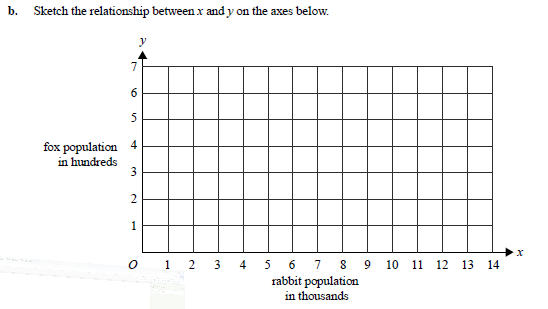
Machine generated alternative text: -hi
62

6.

9. Machine generated alternative text: 

**2008**

Machine generated alternative text: Question 4
An island has a population of rabbits and a population of foxes. The foxes eat rabbits as their food somce and if
the rabbit population decreases. then after some time, so will the fox population. Also, if the rabbit population
increases, then after some time. so too tsill the fox population.
At time t months from the start of the year there are x thousand rabbits andy hun&ed foxes. A model for the
two populations is given by the parannic equations
Rabbits x=1O+3cos(3ij,tO
j,6 J
Foxes y=s+sin(j9to.
a. Find the cartesian equation relating x andy according to this model.



Machine generated alternative text: n. How my foxes are on the island at this time?Machine generated alternative text: c. I. After bow many months from the start of the year is the population of rabbits. x thousand. a
inininuim?

Machine generated alternative text: An a1tenative model fo the inteniction of the two populations, which more accurately ailo for the dependency
of the foxes on the rabbits as a food source. is given by the pail of differential equations
Rabbits —=0ix—O.1x.t0
dt ‘
dv
Foxes —-=—0.2v+OE02xv, r-. O
. dv xv—10v
d. i. Show that =_______
cfr 25x—5xy

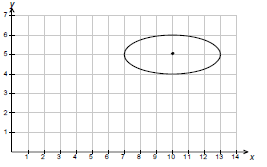
Machine generated alternative text: u. U,e calculus to verify that the cirve with equation
251og,,(v)—5y—x+lOlog,(x)=c
wbere c is a constant of integration, satisfies the differential equation given in part d. t

Machine generated alternative text: For ceitam populations of foxes and rabbits c = 27.5 The graph of the solution curve fiom part d. ii. for this
value of c is shown below.
V
6
5
fox population 4
in hundreds
;   ;    12
rabbit population
in thousands
e. Determine the minimum and manmum numbers of rabbits possible according to the alternative modeL
cotTect to the nearest ten rabbits.

**Answers**

Machine generated alternative text: (x—10)2 2
+(v—5) =1
3-

4. a.



b.

c. i. Machine generated alternative text: 6 months

Machine generated alternative text: 500 foxes ii.

Machine generated alternative text: dv dt —O.2v+O.02.rv 50 xv—10v
—x—= X— =
dt dx O.5x—O.lxv 50 25x—5n’

d. i.

Machine generated alternative text: ( lo
i  lo d  lo)
25x———5——1+—=O,—=
vdx dx x dx (25) x

ii.

Machine generated alternative text: 6590 and 14430 rabbits e.

**2007**

Machine generated alternative text: Question 3
Find the equation of the tangent to the curve — 2xy + 2y2 =2 at the point P(2. 3).

Machine generated alternative text: Question 5
A car travelling at 20 mct passes a stationary police car. and then decelerates so that its velocity y mc’1. at time
t seconds after passing the police car, is given by V =20—2 tair4Q).
a. After how many seconds will the car’s speed be 17 ms-1? Give your answer correct to one decimal
place

Machine generated alternative text: b. Explain why y will never equal 16.

Machine generated alternative text: e. Write doii a definite integral which ves the distance. x metres. travelled by the car afoer Tsecond&

Machine generated alternative text: Thee seconds later the police car starts to chase the passing car which has a polluting exhaust pipe. The police
car accelerates so that its velocity ‘w at tint t seconds after the polluting car passed it is given by
‘13— Zt
v=l3cos1 ) for te [3.8].
d. Write down an expression which gives how far the polluting car is ahead of the police car when
t 8 seconds.
Find this distance in metres coniect to one decimal place.

Machine generated alternative text: After accelerating for five seconds the police car continues at a constant velocity
e. At time t = 1 the police car catches the polluting car. Write an equation which. theu wived, gives the
value of 7..

Machine generated alternative text: f. Find 2 conct to the neaœit second.

**Answers**

3. Machine generated alternative text: 

Machine generated alternative text: 17 = 20—2tan’(t). t = tan(1.5), t =141, correct to one decimal place

5. a.

Machine generated alternative text: V—*2O—,r.16.858

b.

Machine generated alternative text: j(2o—2tan’(t)) df

c.

Machine generated alternative text: S 8 13—2i
[(20—2 tan1 (t)) dt— [13cos’ j dt = 60.7 ni, correct to one decimal place.

d.

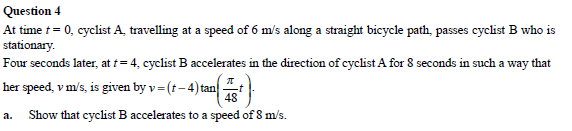
Machine generated alternative text: When t=8. Vpe = 26.178(ni/s) so 60.7÷[(20_2tan4(t)) dt = 26.178(1 —8)orequivalent.

e.

Machine generated alternative text: 7. = 14.6 —15 s, correct to the nearest second

f.

**2005**



Machine generated alternative text: Cyclist B then maintains bet speed of 8 m’s. The velocity-time graph that represents this situation is shon
below.
8
6 ‘
() 4 12
b. Find the tame at which cyclist B passes cyclist A. correct to the nearest tenth of a seconi

**Answer**

4. b. 36.6 sec