		$not \frac{\sqrt{b}}{xb}$ bni $\overline{1}$.
	ו פרפ MOT allowed any Calcu ו will be supplied with a formu	
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	sə3nuim 31	:bəwollA əmi
 Теасhег:	24017419	Aame:

V Sin (et	9 = -6 9 = -6 0 cos(6 _k)	$=$ ℓ (q
-3 V	<u> </u>	
263x	= Ap	
		$\frac{\sqrt{b}}{xb} \text{ bnif. } 1$
	You are NOT allowed ar	<u>instructions:</u>
	sətunim 31 :	
	71	Marks:
Teacher:	200171202	Name:
Resource Free Teacher:	200171202	:əmsN
Trigonometric Functions Resource Free		COITEGE
Resource Free	ı "SI	

c)
$$y = 3x^2e^{2x}$$

$$= 3x^2 \cdot 2e^{2x} + e^{2x} \cdot 6x$$

$$= 6x^2e^{2x} + 6xe^{2x}$$

$$= 6xe^{2x}(x+1)$$
d) $3\tan(1+e)^2$

[3,3,3,2 = 11 Marks]

2. Find the equation of the tangent to the curve defined by $h = (t^2 - 1)(t + 1)^8$:at the point (1,0).

$\frac{dk}{dl} = (k^2 - 1) 8(k+1)^7 + (k+1)^8(2k)$	
$= 8(t^2-1)(t+1)^7 + 2t(t+1)^8 $	
$= 2(\pm +1)^{7} \left[4(\pm^{2}-1) + \pm (\pm +1) \right]$	
$= 2(k+1)^{7}(4k^{2}-4+k^{2}+k)$	
$= 2(\pm 1)^{7}(5\xi^{2} + \pm -4)$	
= 2(t+1)"(t+1)(5t-4)	
= 2(t+1)8 (St-4)	
When E=1	
dl = S12 //	
<u>ar</u>	
Now	
y-n= m(x-x1)	
y-0 = 512(2-1)	*********
y = 512x-512	
[6 Mar	ks]

MATHEMATICS DEPARTMENT

Year 12 Methods - Test Number 1 - 2016
Differentiation of Exponential and
Trigonometric Functions
Resource Rich



ALL SAINTS' COLLEGE

Marks: 28 Time Allowed: 30 minutes Time Allowed: 30 minutes Time Allowed: 30 minutes Time Allowed: 30 minutes To minutes: 400 will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientia from Murdoch University. The population, P, after t years is modelled by the equation P=4000e⁴⁰⁰¹¹ P=4000e⁴⁰¹¹ P=4000e⁴⁰⁰¹¹ P=4000e⁴⁰⁰¹¹ P=4000e⁴⁰¹¹ P=4000e⁴⁰°¹¹ P=4000e⁴⁰°¹¹ P=4000e⁴°⁰¹¹ P=4000e⁴°¹¹ P=4000e⁴°⁰¹¹ P=4000e⁴°°¹ P=4000e⁴°°¹ P=4000e⁴°°¹ P=4000e⁵°°¹ P=4000e⁵°°¹ P=4000e⁵°°¹ P=4000e⁵°°¹ P=4000e⁵°°¹ P=4000e⁵°°¹ P=4000e°°°¹ P=4000e°°°° P=4000e°°°°					
Narke: 30 minutes rime Allowed: 30 minutes natructions: You see allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} a) What was the initial population of this colony of numbates? P=4000e ^{-0.01t} b) Find the exponential growth/decay of this colony?				^	
Marks: 30 minutes Ime Allowed: 30 minutes Mou will be supplied with a formula sheet. You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} 8) What was the initial population of this colony of numbates? P=4000e ^{-0.01t} P=4000e ^{-0.01t} O Find the exponential growth/decay of this colony?				,	
Marks: 30 minutes Ime Allowed: 30 minutes Mou will be supplied with a formula sheet. You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} 8) What was the initial population of this colony of numbates? P=4000e ^{-0.01t} P=4000e ^{-0.01t} O Find the exponential growth/decay of this colony?	***************************************		+	085 ×9 6	When be
Narke: 30 minutes Ime Allowed: 30 minutes restructions: You will be supplied with a formula sheet. You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} 8) What was the initial population of this colony of numbats? P=4000e ^{-0.01t} P=40					
Narks: 30 minutes Ifine Allowed: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} B=4000e ^{-0.01t} The population of this colony of numbats? That was the initial population of this colony of numbats?			years?	2 rəfta noitaluqo	c) Find the p
Narke: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} a) What was the initial population of this colony of numbats? P=4000e ^{-0.01t} P=4000e ^{-0.0}					
Narke: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.0.1t} a) What was the initial population of this colony of numbats? P=4000e ^{-0.0.1t} P=40					\
Marks: 30 minutes Ima Allowed: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P = 4000e ^{-0.01t}				0	
Marks: 30 minutes Ima Allowed: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P=4000e ^{-0.01t} P = 4000e ^{-0.01t}			~ 644 con 198	401 Jo mos.	s.b
Marke: 30 minutes Time Allowed: 30 minutes The population of a colony of numbate is being monitored by a group of scientis from Murdoch University. The population of a colony of numbate is being monitored by a group of scientis from Murdoch University. The population , P, after t years is modelled by the equation P=4000e⁻⁰⁰⁰⁰ P=4000e⁻⁰⁰⁰ P=4000e⁻⁰⁰⁰ P=4000e⁻⁰⁰ P=4000e⁻⁰⁰ P=4000e⁻⁰⁰ P=4000e⁻⁰ P=4000e⁻⁰ P=4000e⁻⁰ P=4000e⁻⁰ P=4000e⁻⁰ P=4000e⁻					
Narke: 30 minutes Ime Allowed: 30 minutes Pou will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} P=4000e ^{-0.01t} S) What was the initial population of this colony of numbats?		s colony?	h/decay of this	wong laitnanoux	b) Find the e
Marks: 30 minutes matructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e ^{-0.01t} P=4000e ^{-0.01t} S) What was the initial population of this colony of numbats?					
Marks: 30 minutes Time Allowed: 30 minutes The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation P=4000e-001t				V 000+	
Marks: 30 minutes Time Allowed: 30 minutes Tatructions: You will be supplied with a formula sheet. You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation equation P=4000e-001t		/		т т	
lime Allowed: 30 minutes natructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation		Satadmun to vnol	os sidt to noite	slugog leitini ədt	sew tedW (s
lime Allowed: 30 minutes natructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the equation				20001 - 1	
lime Allowed: 30 minutes restructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the				^{110.0} -9000A-9	
lime Allowed: 30 minutes restructions: You are allowed a ClassPad and 1 page of notes (both sides). You will be supplied with a formula sheet. The population of a colony of numbats is being monitored by a group of scientis from Murdoch University. The population, P, after t years is modelled by the					ednation
The population of a colony of numbats is being monitored by a group of scientis	erred by tire	r, aiter t years is moo	c population;	on oniversity, th	
Narks: 30 minutes 30 minutes and 1 page of notes (both sides). You will be supplied with a formula sheet.		_			
Narks: 28 minutes 30 minutes 30 minutes and 1 page of notes (both sides).	situaiss to ano.	p e yd beaotinom pni	iod si stedmun	jo kaojos e jo ao	iteliiana adT (
Narks: 28 minutes 30 minutes 30 minutes and 1 page of notes (both sides).					
Narks: 28 minutes 30 minutes			-		
Таткя: 28 ime Allowed: 30 minutes		.14	h a formula shee	liw beilqque ad lliw	noX
Таткя: 28 ime Allowed: 30 minutes		or notes (born sides).	ekad and i page	SELO REDAMON SE CISS	nou :suonanus:
gs.ks: 28		(race y pace page	10 - hamalla ara .	X
ysrks: 28					
				30 minutes	:bəwollA əmi
				07	'ou mu
теяснег:				28	Narks.
		Теасћег:			:ewe

		-
	Extra space for working out	
ı	**End of Test**	
٠	(-1) <i>y</i> = 0 0 0 3	
15		
	~ (1-y*S)	
	V (1582-10401-1281) -	_
	$(z^{\chi}\zeta - 1)$	
	$\frac{x^{\delta_{\mathcal{S}}}}{(-1)^{2}} $ (o	

		_
	V 22 L 21 (1+ (25) 8-	
	b) $[1+\cos(2x)]^4$	
	7,500 = = = = = = = = = = = = = = = = = =	
	or 3x2 sec 2x + bxtunx or 3x2 + 6xtunx	
	3x ([Lank] + 3x + 6x hank /	, mai
-	/ 7 / 2 / 1/2 8	
	$3x^2$ tan (x)	

4) Differentiate each of the following with respect to x:

d) After how many years will the population of numbats be half the size of the original population?

[1,2,2,2 = 7 Marks]

2) An Olympic Ski Jumping slope has been designed so that it follows the curve:

$$y = 3\cos(\frac{\pi x}{4}) + 8$$
 for $0 \le x \le 5$, where x and y are both in metres.

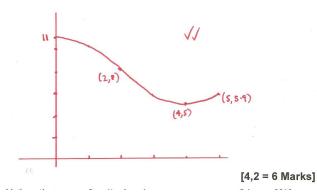
a) What is the take-off angle at the end of the jump (to the nearest degree) remembering that $m = \tan \theta$?

$$\frac{dy}{dx} = -\frac{3\pi}{4} \sin\left(\frac{\pi x}{4}\right) / / \qquad m = + \cos\left(\frac{\pi x}{4}\right) / / \qquad m = + \cos\left(\frac{\pi x}{4}\right) \approx 59.0274^{\circ}$$

$$\frac{dy}{dx} = -\frac{7\pi}{4} \sin\frac{\pi x}{4} \qquad = 59^{\circ}$$

$$= -\frac{\pi}{4} \cdot \frac{\pi x}{2} = \frac{3\pi x}{4} = \frac{3\pi x}{2} = \frac{3\pi x}{4} = \frac{3\pi x}$$

ь) Sketch the curve below:



- 3) Western Australia is suffering from a decrease in average annual rainfall over time, t years, according to the formula $\frac{dR}{dt} = -.00975R$. The first average annual rainfall measured in WA was 880mm.
 - a) Find a formula for the average annual rainfall in this region.

b) Find the average annual rainfall after:

i) 20 years

When
$$t = 20$$
 $R = 724.09$

ii) 100 years

c) What is the rate at which the rainfall is decreasing after 100 years.

[2,2,2,3 = 9 marks]