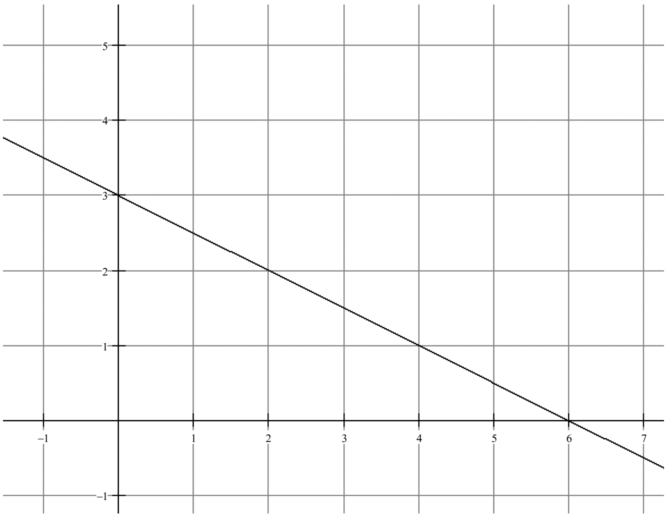
Question One:	**Marking**	**Comments**
a) 1.242886646	❶ answer	
=1.243 (to 3dp)	❶ dp’s	
b) $3-2x=4x$	❶ algebra	
$3=6x$		
$x=\frac{1}{2}$	❶ answer	
c) $\frac{2}{1+\sqrt{3}}\times\frac{1-\sqrt{3}}{1-\sqrt{3}}$	❶ $\times$conjugate	
$=\frac{2(1-\sqrt{3})}{1-3}$		
$=\frac{2(1-\sqrt{3})}{-2}$		
$=\sqrt{3}-1$	❶ answer	In simplest form!
d) $=4+12x-x-3x^2$	❶ resolves pairs	
$=4(1+3x)-x(1+3x)$		
$=(1+3x)(4-x)$	❶ answer	
e) $2y=6-x$		
$y=3-\frac{1}{2}x$		
f) $x=0$: $y=0$:	❶ intercepts	Some had trouble finding these!
$y=3$ $x=6$		



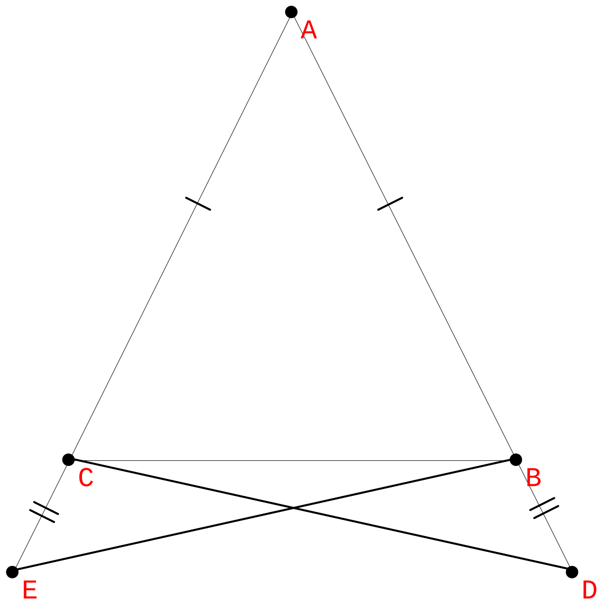
❶graph

g) $3y=4x-1$		
$y=\frac{4}{3}x-\frac{1}{3}\Rightarrow m_1=\frac{4}{3}$, so perp. gives $m_2=-\frac{3}{4}$	❶ perp. gradient	
So through $(2,-3)$:		
$y-(-3)=-\frac{3}{4}(x-2)$		
$4y+12=-3x+6$		
$3x+4y+6=0$	❶ eqn (in GF)	Again, simplify!

Question Two:	**Marking**	**Comments**
a) i) $u = x^2 \quad v = e^x$ $du = 2x \quad dv = e^x$	❶ product rule	Mostly good
$\therefore \dfrac{d(x^2e^x)}{dx}$ $= x^2e^x + 2xe^x$		
$= xe^x(x+2)$	❶ answer	
ii) $\dfrac{d(1+\tan x)^2}{dx}$	❶chain rule	Some struggled with structure of the Chain Rule.
$= 2(1+\tan x)^1 \times \dfrac{d(\tan x)}{dx}$ $= 2\sec^2 x(1+\tan x)$	❶ answer	Some did not know the derivative of tan$x$.
b) i) $\int 4x - \sin x\,dx$	❶ answer	Quite a few integration errors, and some forgot "+c"
$= 2x^2 + \cos x + c$	❶ for '+c'	
ii) $\int_1^3 \dfrac{1}{x^2}\,dx$		Many 2 Unit candidates got a log or differentiated. Many also made sign errors in substitution.
$= \left[-\dfrac{1}{x}\right]_1^3$	❶ int & limits	
$= \dfrac{-1}{3} - \dfrac{-1}{1}$	❶ subst	
$= \dfrac{2}{3}$	❶ answer	
c) $\dfrac{dy}{dx} = 1 + \dfrac{1}{x^2}$,	❶ derivative	Some could not find derivative. Many errors to find "m=2" ("m=0" was popular). More seriously, not finding an "m" value but using algebra: $y = \left(1 + \dfrac{1}{x^2}\right)(x+1)$ is meaningless!
so when $x = -1$ $\dfrac{dy}{dx} = 2$	❶ gradient	
Hence $y - 0 = 2(x+1)$ or $y = 2x + 2$	❶ answer	

Question Three: **Marking** **Comments**

a) i)



❶ markings

Some students failed to give all the information required.

ii) AB=AC and BE=CD (given)
AD=AB+BD, AE=AC+CE (st. lns), so
AD=AC+CE, hence
AD=AE ❶ reason
In $\Delta's\ ABE, ACD$

Some did not show this (or equivalent);
Need to state the triangles;

i) AB = AC (given) ❶ reason
ii) $\angle EAB = \angle DAC$ (common angle) ❶ reason
iii) AD=AE (shown above)
$\therefore \Delta ABE \equiv \Delta ACE$ (SAS) ❶ conclusion

Some did not state the test used.

b) For $y = e^{x^2}$, with $h = 0.5$: ❶ values

x	0	0.5	1	1.5	2
y_i	1	$e^{0.25}$	e	$e^{2.25}$	e^4

Simpsons Rule:

$$A = \frac{h}{3}\left[\left(y_0 + y_4\right) + 2\left(y_1 + y_3\right) + 4y_2\right]$$ ❶ subst

$$= \frac{0.5}{3}\left[\left(1 + e^4\right) + 4\left(e + e^{2.25}\right) + 2e\right]$$

$$\doteq 17.35362645$$

$$\doteq 17.35$$ ❶ ans to 2dp

Some students had the 4 and the 2 the wrong way around in the formula.

c) With $T_3 = \frac{1}{12}, T_8 = \frac{-1}{384}$:

i. $ar^2 = \frac{1}{12}$ and $ar^7 = \frac{-1}{384}$, hence

$$\frac{T_8}{T_3}=\frac{-1}{384}\div\frac{1}{12}$$
$$\frac{ar^7}{ar^2}=\frac{-1}{384}\times\frac{12}{1}$$
$$r^5=\frac{-1}{32}$$
$$r=\frac{-1}{2}$$

This part done well provided the correct ratio of $\frac{-1}{2}$ found (some used $\frac{\pm1}{2}$ or $\frac{1}{2}$.

$$a.\left(\frac{-1}{2}\right)^2=\frac{1}{12}$$
$$a=\frac{1}{3}$$

❶ a, r values

$$T_n=ar^n$$
$$=\frac{1}{3}.\left(\frac{-1}{2}\right)^n$$

❶ T_n correct

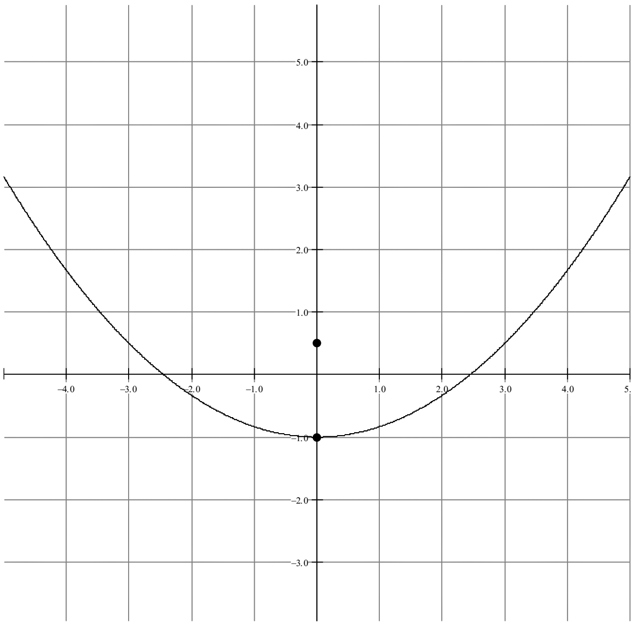
ii. $$S_n=\frac{a\left(1-r^n\right)}{1-r}$$
$$S_8=\frac{\frac{1}{3}\left(1-\left(\frac{-1}{2}\right)^8\right)}{1-\frac{-1}{2}}$$
$$=\frac{\frac{1}{3}\left(1-\frac{1}{256}\right)}{\frac{3}{2}}$$
$$=\frac{1}{3}.\frac{2}{3}.\frac{255}{256}$$
$$=\frac{85}{384}$$

❶ S_8 correct

This answer best left as a fraction.

iii. $$S_\infty=\frac{a}{1-r}$$
$$=\frac{\frac{1}{3}}{1-\frac{-1}{2}}$$
$$=\frac{1}{3}.\frac{2}{3}$$
$$=\frac{2}{9}$$

❶ S_∞ correct

<u>Question Four</u>:	**Marking**	**Comments**
a) $\cos x = \frac{\sqrt{3}}{2}$		
$x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$		
$= \frac{\pi}{6}$	❶ base angle	Many did not read the requirements of the question:
$\cos x$ positive in Q1 & Q4, but with $-\pi \le x \le \pi$,		$-\pi \le x \le \pi$ also
$x = \frac{\pi}{6}, \frac{-\pi}{6}$	❶ answers	implies radians!
b)		
i. Vertex is $(0,-1)$	❶ answer	
ii. $4a = 6$		
Hence $a = \frac{3}{2}$, so focus is $(0,-1+a)$ or		
$\left(0,\frac{1}{2}\right)$	❶ answer	
iii.		
	❶ graph	Sketch was poorly done by many – must show vertex, focus, intercepts. Use a ruler to draw axes!
iv. $y = 5$ and $x^2 = 6(y+1)$	❶ eqn for Int	Poorly done. Students need to review area between two curves.
$x^2 = 6(5+1)$ $= 36$		
$y+1 = \frac{x^2}{6}$		
$y = \frac{x^2}{6} - 1$		
$x = \pm 6$, hence	❶ boundaries	

$$A=\int_{-6}^{6}5-\left(\frac{x^2}{6}-1\right)dx$$

$$=2\int_{0}^{6}5-\left(\frac{x^2}{6}-1\right)dx$$

$$=2\left[6x-\frac{x^3}{18}\right]_0^6$$

$$=2\left[\left(6^2-\frac{6^3}{18}\right)-0\right]$$

$$=48$$ ❶ answer

c)

i. First die 1 to 4 must correspond to 2nd die 4 to1, so 4 outcomes give a total of 5 ❶ reason for 4

$$P(5)=\frac{4}{36}$$

$$=\frac{1}{9}$$ ❶ answer

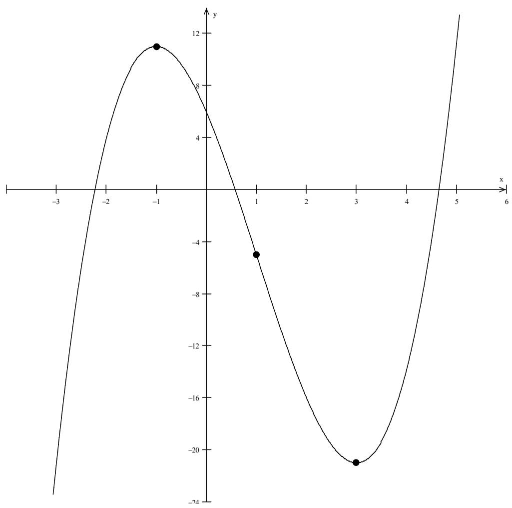
ii. $P(not\,5)=1-P(5)$

$$=1-\frac{1}{9}$$

$$=\frac{8}{9}$$ ❶ answer

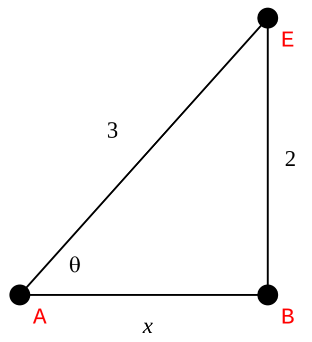
iii. $P(doubles)=\frac{1}{6}$ ❶ answer

Question Five:	**Marking**	**Comments**
a)		
i. By Pythagoras: $AC^2 = 10^2 - 6^2$ $= 64$ $AC = 8$	❶ answer	
ii. $\angle DFA = \angle BCA = 90^\circ$ For BC and DF, $\angle DFA$ and $\angle BCA$ are in a corresponding position and equal. Hence $BC \parallel DF$.	❶ reasoning	Some students failed to recognise corresponding angles, or failed to write that fact down!
iii. In $\Delta's\ ADF, ABC$ $\angle DFA = \angle BCA = 90^\circ$ (given in diagram) $\angle A$ is common.	❶ reasons	
Hence all angles are equal so $\Delta AFD \mid\mid\mid \Delta ABC$	❶ conclusion	
iv. Similarly, $\Delta BDE \mid\mid\mid \Delta ABC$, hence $\frac{DE}{AC} = \frac{DB}{AB}$ $\frac{3}{8} = \frac{DB}{10}$	❶ subst	
$DB = 3.75$	❶ answer	
b) $y = x^2 - 2x$; $x = 2, y = 0$ $\frac{dy}{dx} = 2x - 2; x = 2, \frac{dy}{dx} = 2$, so normal gradient is $\frac{-1}{2}$	❶ gradient	Parts b) and c) generally well done.
$y - 0 = \frac{-1}{2}(x-2)$ $y = 1 - \frac{x}{2}$ $0 = x + 2y - 2$	❶ answer	
c) $g(0) = 4 : 4 = a.0^2 + b.0 + c$ $g(1) = 23 : 23 = a.1^2 + b.1 + c$ $g(-1) = 1 : 1 = a.(-1)^2 + b.(-1) + c$, giving the eqns $4 = c \quad \langle 1 \rangle$ $23 = a + b + c \quad \langle 2 \rangle$ $1 = a - b + c \quad \langle 3 \rangle$	❶ set-up	
$\langle 1 \rangle$ in $\langle 2 \rangle$ and $\langle 3 \rangle$ gives: $a + b = 19$ $a - b = -3$, then adding gives: $2a = 16$; back-substitution gives $23 = 8 + b + 4$ $a = 8 \qquad b = 11$ Hence $a = 8, b = 11, c = 4$	❶ answers	

Question Six:	**Marking**	**Comments**
a)		
i. y-intercept at $(0,6)$.	❶ answer	
ii. $y' = 3x^2 - 6x - 9$		
$y'' = 6x - 6$		
Stat Pts when $y' = 0$:		
$0 = 3x^2 - 6x - 9$		
$= x^2 - 2x - 3$		
$= (x-3)(x+1)$		
$\therefore x = -1, 3$	❶ x values	
$x = -1$ $\quad$ $x = 3$		
$y = (-1)^3 - 3(-1)^2 - 9(-1) + 6$ $\quad$ $y = (3)^3 - 3(3)^2 - 9(3) + 6$		
$= 11$ $\quad$ $= -21$		
Pts are $(-1,11)$ and $(3,-21)$		
$x = -1$ $\quad$ $x = 3$		Make sure co-ordinates are stated when the question asks for them
$y'' = -12$ $\quad$ $y'' = 12$		
$\Rightarrow ccd$ $\quad$ $\Rightarrow ccu$	❶ test	
$\therefore$ $(-1,11)$ is a max t.p.		
and $(3,-21)$ is a min t.p.	❶ points	
iii. $y'' = 0 : 0 = 6x - 6$, hence possible inflection pt when $x = 1$.		
when $x < 1, y'' < 0 \Rightarrow ccd$		
when $x > 1, y'' > 0 \Rightarrow ccu$		<u>Must</u> test the nature of Stat. Pts and Inflexion Pts!
hence concavity changes, so $(1,-5)$ is a point of inflexion.	❶point & test	
iv. Concave up when $y'' > 0$		
$6x - 6 > 0$		
$6x > 6$		
i.e. when $x > 1$	❶ answer	
v. 	❶ t.p's ❶ intercepts	Sketch very poorly done. Use: • a ruler for axes • a suitable scale Show the information requested: • turning points • inflexion point • intercepts (x and y)

b) $\sin\theta = \dfrac{-2}{3}$

Some students did not know the ASTC results.



Hence $x^2 = 3^2 - 2^2$, or $x = \sqrt{5}$

$\sin\theta < 0 \Rightarrow Q_3, Q_4$

$\cos\theta > 0 \Rightarrow Q_1, Q_4 \Rightarrow \tan\theta \, in \, Q_4; \tan\theta < 0$ ❶ quadrant

Hence $\tan\theta = \dfrac{-2}{\sqrt{5}}$ ❶ answer

c) $\dfrac{d(xe^x)}{dx}$ $\quad u = x \quad v = e^x$

$u' = 1 \quad v' = e^x$ ❶ product rule

Showing a result – you must clearly demonstrate the link for each step.

$= xe^x + 1.e^x$

$= e^x + xe^x$ as reqd.

Hence $\dfrac{d(xe^x)}{dx} = e^x + xe^x$, so integrating gives:

$xe^x = \int (e^x + xe^x)\,dx$

$= \int e^x\,dx + \int xe^x\,dx$

$\therefore \int xe^x\,dx = xe^x - \int e^x\,dx$

$= xe^x - e^x + c$

$= e^x(x-1) + c$ ❶ answer

<u>Question Seven</u>: **Marking** **Comments**

a) $4x^2 + 8x - 1 = 0$:

i. $\alpha + \beta = \frac{-8}{4}$ ❶ answer

$= -2$

ii. $\alpha\beta = \frac{-1}{4}$ ❶ answer

iii. $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

$= \frac{\alpha^2 + \beta^2}{\alpha^2\beta^2}$

$= \frac{(\alpha+\beta)^2 - 2\alpha\beta}{(\alpha\beta)^2}$ ❶ resolves — Many had problems with this identity

$= \frac{(-2)^2 - 2.\frac{-1}{4}}{\left(\frac{-1}{4}\right)^2}$

$= 16\left(4 + \frac{1}{2}\right)$

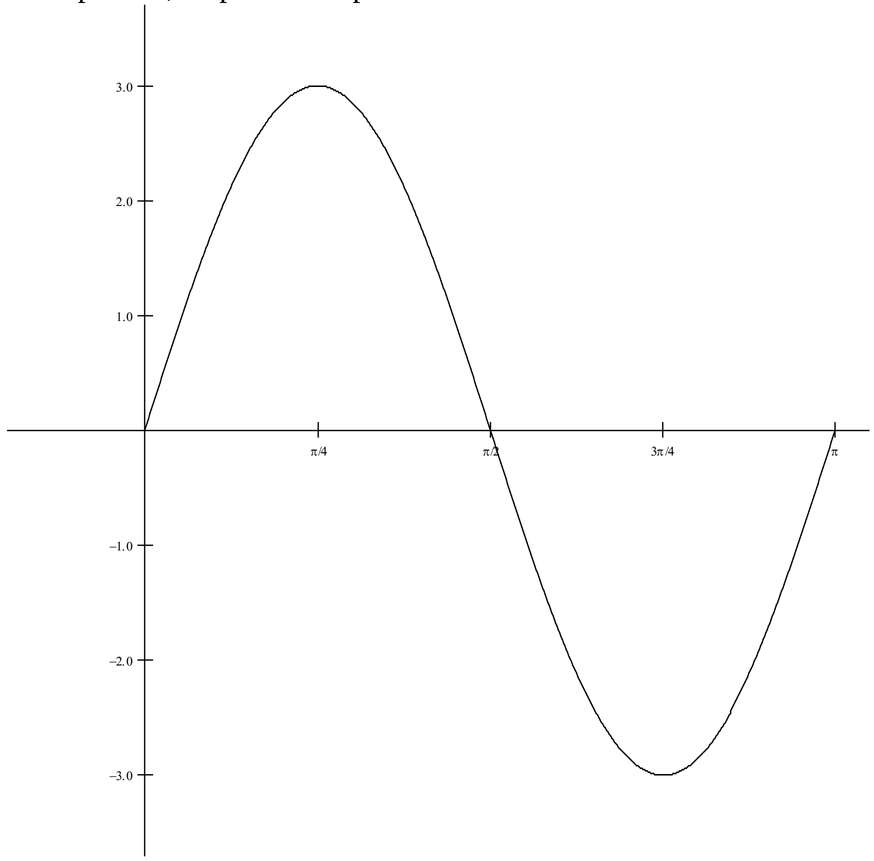
$= 72$ ❶ answer

b) $y = 3\sin 2x$

i. Amplitude is 3 ❶ answer

ii. Period is $\frac{2\pi}{2}$, or π ❶ answer

iii. ❶ amplitude, ❶ period/shape — Some drew Cos!



c)

i. $\log_2 45$

$= \log_2 (5 \times 9)$

$= \log_2 5 + \log_2 3^2$

$= \log_2 5 + 2\log_2 3$

$= 2.322 + 2 \times 1.585$

$= 5.492$ ❶ answer

Many multiplied the logs, instead of adding them.

ii. $\log_7 0.3$

$= \dfrac{\ln 0.3}{\ln 7}$

$= -0.6187196284$

$\simeq -0.619$ ❶ answer

d) $9x^2 - 3x + p = 0$

For only one root, $\Delta = 0$

Too many had $\Delta > 0$ for one real root!

$\therefore b^2 - 4ac = 0$

$0 = 9 - 4.9.p$ ❶ set-up

$36p = 9$

$p = \dfrac{1}{4}$ ❶ answer

This was also successfully resolved by sums and products of roots by many:

Alternate marking for (d):

$\alpha + \beta = -\dfrac{-3}{9}$, $\alpha\beta = \dfrac{p}{9}$ $\alpha = \beta$, giving:

$2\alpha = \dfrac{1}{3}$

$\alpha = \dfrac{1}{6} (= \beta)$ ❶ uses = roots

$\left(\dfrac{1}{6}\right)^2 = \dfrac{p}{9}$

$p = \dfrac{9}{36}$

$= \dfrac{1}{4}$ ❶ answer

Question Eight: | **Marking** | **Comments**

a)

i. $l = r\theta$

$4\pi = 12\theta$

$\therefore \theta = \frac{\pi}{3}$

❶ answer

Well done.

ii. $A = \frac{1}{2}r^2\theta$

$= \frac{1}{2}.12^2.\frac{\pi}{3}$

$= 24\pi\ cm^2$

❶ answer

Mostly good. A few tried to find the area of a segment or triangle.

b) $y = e^x + e^{-x}$, so

$y^2 = (e^x + e^{-x})^2$

$= e^{2x} + 2e^x e^{-x} + e^{-2x}$

$= e^{2x} + e^{-2x} + 2$

❶ y^2 correct

Volume is given by:

$$v = \int_0^2 \pi y^2\, dx$$

$$= \pi \int_0^2 e^{2x} + e^{-2x} + 2\, dx$$

$$= \pi \left[\frac{1}{2}e^{2x} - \frac{1}{2}e^{-2x} + 2x \right]_0^2$$

❶ int & limits

$$= \pi \left[\left(\frac{1}{2}e^4 - \frac{1}{2}e^{-4} + 4 \right) - \left(\frac{1}{2}e^0 - \frac{1}{2}e^0 + 0 \right) \right]$$

$$= \frac{\pi}{2}\left(e^4 - e^{-4} + 8\right) cu.units$$

❶ answer

Students who could expand y^2 correctly generally got full marks.
A few made horrible integration attempts ☹:
$\int e^{2x}dx = \left[\frac{e^{x^2}}{x^2}\right]$
Some mistakes substituting:
$e^0 - e^0$

c)

i. $T_1 = 10, T_2 = 15, T_3 = 20...$

$T_2 - T_1 = 5; T_3 - T_2 = 5$, so this is an AP with $a = 10, d = 5$, hence

$T_n = 10 + 5(n-1)$

$= 5 + 5n$

❶ justifies AP then shows subst

When $n = 10$

$T_n = 5 + 5.10$

$= 55$

❶ to get answer

ii. $S_n = \frac{n}{2}\left(2a + (n-1)d\right)$, so radius will be

$r = 5 + S_n$, so

❶ radius correct

$S_n = 455 - 5$

$= 450$

i) Was poorly set out – when a question says "Show that..." you must show yout thinking, theory used and calculations!
For full marks, students needed to show that they recognised an AP and then substituted.
A good answer would have proved an AP (as shown in solns).

$$450 = \frac{n}{2}\left(2\times 10 + 5(n-1)\right)$$
$$900 = n(15+5n)$$
$$0 = 5n^2 + 15n - 900$$
$$= n^2 + 3n - 180$$
$$0 = (n+15)(n-12)$$
$$n = -15, 12$$

As $n > 0$, there are 12 strips needed.

➊ forms quadratic

➊ answer justified

Students needed to recognise the extra 5cm centre and deduct it; for full marks, justification for the positive solution was needed.

d) $4e^{2x} - e^x = 0$, let $u = e^x$, then

$$0 = 4u^2 - u$$
$$= u(4u-1)$$

$u = 0, \frac{1}{4}$, hence

➊ resolves quad

$$e^x = 0, e^x = \frac{1}{4}$$

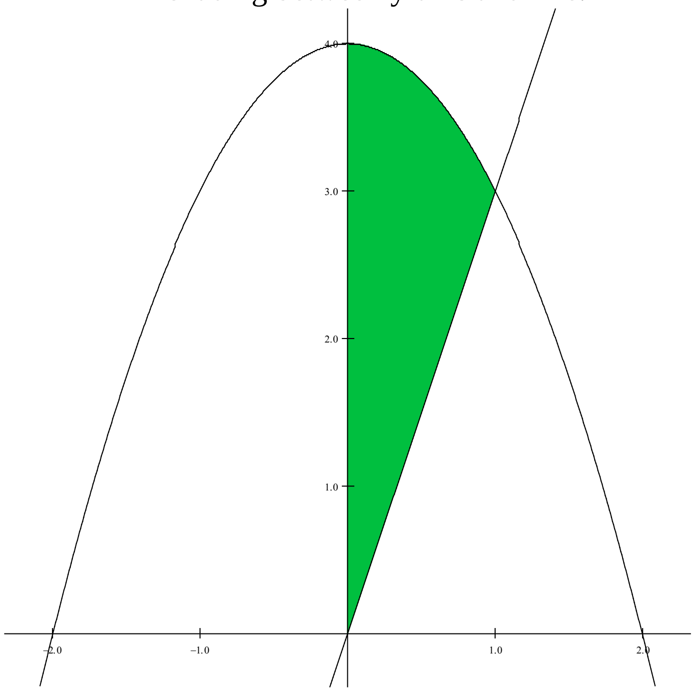
$e^x = 0$ has no solution.

$$e^x = \frac{1}{4}$$
$$x = \ln\left(\frac{1}{4}\right)$$
$$= -2\ln 2$$
$$(= -1.386294361)$$

➊ answer justified

For full marks, students needed to give the two expressions for e^x and state that $e^x = 0$ has no solution.

Question Nine:	**Marking**	**Comments**
a) $y \le 4 - x^2$		
i. ❶ shading below parabola, ❶ shading between y-axis and line.		



ii. Solving $y = 3x$ and $y = 4 - x^2$ simultaneously: $3x = 4 - x^2$ $0 = x^2 + 3x - 4$ $= (x+4)(x-1)$ $x = -4, 1$		Poorly done. Most students failed to establish the equation in terms of *y*, and hence did not find the correct *y* values for the integration. Many also did not recognise the need to split the integral into two parts.
Hence intersection at $(1, 3)$	❶ values	
So volume of solid to *y*-axis is $V = \pi \int_a^b x^2 \, dy$		
$y = 4 - x^2$ becomes $x^2 = 4 - y$		
$y = 3x$ becomes $x = \frac{y}{3}$ or $x^2 = \frac{y^2}{9}$	❶ both x^2 eqns	
$V = \pi \int_0^3 \frac{y^2}{9} dy + \pi \int_3^4 4 - y \, dy$	❶ int & limits	

$$= \pi \int_0^3 \frac{y^2}{9}\,dy + \int_3^4 4 - y\,dy$$

$$= \pi\left(\left[\frac{y^3}{27}\right]_0^3 + \left[4y - \frac{y^2}{2}\right]_3^4\right)$$

$$= \pi\left(\left(\frac{27}{27} - 0\right) + \left(\left(16 - \frac{16}{2}\right) - \left(12 - \frac{9}{2}\right)\right)\right)$$

$$= \pi\left(1 + 8 - \frac{15}{2}\right)$$

$$= \frac{3\pi}{2}\,cu.units$$ ❶ answer

b) $AB = x$, hence CD, CY and XY are all also x.

i. Total length of fencing is given by:

$700 = AB + CD + CY + XY + BC$

$BC = 700 - 4x$ ❶ Perim link

Poorly done. Most students did not use the sine version of the area of a triangle.

For rhombus $CDXY$:

$$A = 2\times\frac{1}{2}CD.DY.\sin 30°$$

$$= \frac{x^2}{2}$$

For rectangle $ABCD$:

$A = AB.BC$

$= x(700 - 4x)$

$= 700x - 4x^2$

Total area is therefore: ❶ areas & alg

$$A = 700x - 4x^2 + \frac{1}{2}x^2$$

$$= 700x - \frac{7x^2}{2}$$ as reqd.

ii. For a possible maximum, $\frac{dA}{dx} = 0$:

$\therefore \frac{dA}{dx} = 700 - 7x$; $\frac{dA}{dx} = 0$ gives

$0 = 700 - 7x$

$x = 100$ ❶ x-value

$\frac{d^2A}{dx^2} = -7 \Rightarrow ccd$, or a max tp. ❶ max shown

Hence max area is

$$A = 700\times100 - \frac{7\times100^2}{2}$$

$= 35000\ sq.m$ ❶ answer

iii. Paddock is therefore $100m$ by $300m$. ❶ answer

<u>Question Ten</u>: **Marking** **Comments**

a) $\$P$ invested at 9% p.a.

i. First Year: $A_1 = P(1+0.09)$

or $A_1 = 1.09P$ ❶ answer

ii. Second Year: $A_2 = (A_1 + P)(1+0.09)$

or $A_2 = (1.09P + P)(1.09)$

$= 1.09^2 P + 1.09P$

$= P(1.09^2 + 1.09)$ ❶ answer

iii. After n years: $A_n = \left(A_{n-1} + P\right)(1+0.09)$

Using the above pattern, this becomes:

$A_n = P(1.09^n + 1.09^{n-1} + ... + 1.09)$

Now, this is a GP with

$a = 1.09, r = 1.09, n = n$, thus ❶ GP & values

Need to state this is a GP and write the formula

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$$= \frac{1.09(1.09^n - 1)}{1.09 - 1}$$

$$= \frac{1.09(1.09^n - 1)}{0.09}$$

$$= \frac{1.09}{0.09}(1.09^n - 1)$$

$$= \frac{109(1.09^n - 1)}{9}$$ ❶ GP resolved

This step 'fudged' by many.

Hence $A_n = \frac{109P}{9}(1.09^n - 1)$, as reqd.

iv. For A_n =\$1,000,000 and n=30:

$$1,000,000 = \frac{109P}{9}(1.09^{30} - 1)$$

$$\frac{9000000}{109} = P(1.09^{30} - 1)$$

$$P = \frac{9000000}{109(1.09^{30} - 1)}$$

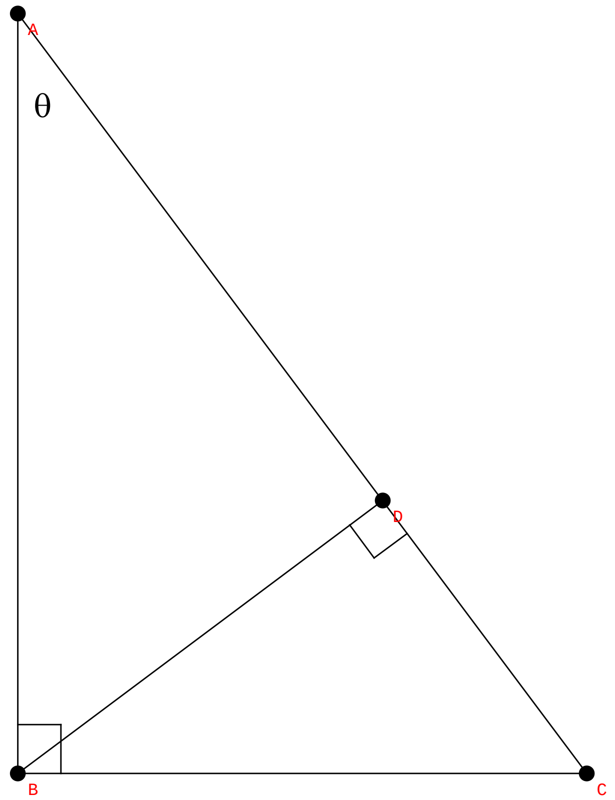
$= 6730.597606$

$= \$6731$ (nearest \$) ❶ answer

Check degree of accuracy required (no marks lost if gave to nearest ¢.

b)

i. ❶ diagram



ii. Given $6AD + BC = 5AC$, expressions for AD, BC and AC in terms of θ:

If students saw the common connection of AB, they generally did well with the question.

$\cos\theta = \dfrac{AD}{AB}$ (from ΔADB)

$AD = AB\cos\theta$

$\tan\theta = \dfrac{BC}{AB}$ and $\cos\theta = \dfrac{AB}{AC}$ (from ΔABC)

$BC = AB\tan\theta$ $AC = \dfrac{AB}{\cos\theta}$

❶ exp for each

Substituting these into the expression above:

$$6AB\cos\theta + AB\tan\theta = 5\frac{AB}{\cos\theta}$$

❶ correct subst & alg

Hence, $6\cos\theta + \tan\theta = 5\sec\theta$ as reqd.

iii. $6\cos\theta + \tan\theta = 5\sec\theta$, becomes

Many poor with Trig identities!

$$6\cos\theta + \frac{\sin\theta}{\cos\theta} = \frac{5}{\cos\theta}$$

$$6\cos^2\theta + \sin\theta = 5$$

❶ sin/cos resolved

$$6(1-\sin^2\theta) + \sin\theta = 5$$

$$6 - 6\sin^2\theta + \sin\theta - 5 = 0$$

❶ subst & alg

Hence $6\sin^2\theta - \sin\theta - 1 = 0$ as reqd.

iv.	Let $u=\sin\theta$ $0=6u^2-u-1$ $=6u^2-3u+2u-1$ $=3u(2u-1)+1(2u-1)$ $=(2u-1)(3u+1)$	❶ quad resolved	Need to solve 2 eqns (a negative angle was not acceptable – need the reflex angle.
	Hence $0=2\sin\theta-1 \qquad 0=3\sin\theta+1$ $\frac{1}{2}=\sin\theta \qquad \frac{-1}{3}=\sin\theta$ $\theta=30° \quad$ *or* $\quad \theta\simeq 199°28'$ Reject $199°28'$, as θ is in a right triangle, so $\theta=30°$	❶ θ correct	Need to give both solutions and reject the invalid one with correct reasoning given.