1. (Total: 2 pts)

+ 2 pts if placed initial of first name and entire last name on each and every numbered page.

2. (Total: 6 pts)

2a. (2 pts)

_____

2b. (2 pts)

_____

2c. (2 pts)
+ 2 pts if students began shading growth immediately after where M1 and M3 cross.
+ 0 pts if the shaded area did not extend past M6.
+ 0 pts if students wrote growth/no growth.
+ 0 pts if we couldn't tell whether students meant horizontal arrow or vertical streak.

3. (Total: 4 pts)

3a. (1 pt)
+ 1 pt if math wrong, but got the fraction correct. $1/(1/4)^4 = 4^4 = 256$.
+ 0.5 pt for $(1/4)^4$.

_____

3b. (1 pt)
+ 1 pt if math wrong, but got the fraction correct. $1/(1/4)^6 = 4^6 = 4096$.
+ 0.5 pt for $(1/4)^6$.

_____

3c. (2 pts)
+ 2 pts if math wrong, but got the fraction correct. $1/(1/4)^4 = 4^4 = 256$.
+ 1 pt for $(1/4)^4$.
(Equal to BstU1 since MLuI cuts the same sequence.)

4. (Total: 4 pts)

+ 4 pts for solvent (organic) and band (second from the top). No partial credit.

5. (Total: 2 pts)

Should have been sex-linked and genetically linked.

+ 1.5 pt for all but sex correct.
+ 1.5 pt for only one allele X-linked, sex correct.
+ 1.5 pt for everything but X-linkage correct.
+ 1 pt for X-linkage (for both) and sex.
+ 1 pt for both traits homozygous recessive + lowercase.
+ 0.5 pt for only sex correct.
+ 0.5 pt for no notations, correct explanation of genotype (no sex).
+ 0.5 pt for both homozygous recessive + uppercase.
+ 0.5 pt for only X-linkage correct.
+ 0.5 pt for only homozygous recessive correct.
+ 0.5 pt for sex and one allele correct.
+ 0.5 pt for one allele X-linked, sex incorrect.
- 0.5 pt for incorrect notation ("seriously" incorrect, where "seriously" = shows lack of understanding of allele/what's on chromosomes, i.e. 1 copy of gene).
- 0.5 pt for phenotype given instead of genotype.

Chart of genotypes and points earned for each:

0	snw	1.5	w/w; X^{sn}/Y	1	X^{w+sn+}/Y
1	w/w; sn/sn	1	X^{snw}/X^{snw} x X^{sn+w+}/Y	0.5	X^{sn+w+}/X^{snw}
0	wsn/w+sn+	1	X^{w}/Y; sn	0	w+sn/wsn+
1	$X^{w}X^{sn}/YY$	1.5	X^{w+sn}/Y	1.5	$X^{sw/sw}/Y$
0	sn/sn; w+/w+	0.5	A+A+/bb	1.5	Female $X^{sn/w}/Y$
1.5	$X^{w}Y$	0.5	sn;w	1.5	$Z^{snw}w$
1	X^{b+s}/Y	0	sw/sw; sn+/sn	0.5	X^{w+sn+}/X^{w+sn+}
1.5	X^{snw}/X^{snw}				

6. (Total: 5 pts)

6a. (4 pts)

1 pt for correct X axis [Substrate] (mM)

1/2 pt for [Substrate] - No other label accepted.

1/2 pt for (mM) - note: mM in parentheses - No other units accepted.

No credit for wrong units. Symbols must also be correct and in correct order: small m followed by capital M.

No credit for: mm, Mm, MM, etc.

1 pt for correct Y axis: Absorbance (O.D. units)

1/2 pt for Absorbance (bold-faced in question)

1/2 pt for (O.D.) - note: O.D. in parentheses

To really label the Y-axis correctly: One should also include the wavelength used (subscript).

1 pt for correct Vmax (must be drawn accurately).

No credit if put Vmax on X-axis (i.e., in substrate units).

No credit if your V did not max.

No credit if not drawn correctly/accurately/carefully.

1 pt for correct 1/2Vmax and Km (must be drawn accurately/correctly).

No credit if don't know that Km is a [S] at 1/2 Vmax.

No credit if you put Km on Y-axis.

No credit if one can't get Km from your drawing.

No credit if Km is way off and not 25 mM as asked.

0 pts for drawing any of these types of graphs: Straight line going up at some angle, a reaction profile graph, a Boltzmann distribution graph, a bell curve; any graph that does not give you the right Vmax, 1/2Vmax, and Km, as asked.

Some of you drew Vmax and gave it substrate units (vertical line down to X-axis), then took half of that to say it's 1/2 Vmax (another vertical line halfway from where you drew the wrong Vmax line, along X-axis) and your Km is on the Y-axis. 0 points for this question. No partial credit.

1 pt deducted for "Km = 1/2 Vmax" - Km is NOT a rate. It's a substrate concentration. (1/2 - 1)pt deducted for things added that are wrong.

6b. (1 pt)
Need to "fill in" the numbers: 1/25

Pts deducted - If you did not divide 1 by 25 mM (mM is in denominator, not numerator), if you did not write 1 over 25 mM

No points for explaining/saying what affinity is.
Question asks, "Calculate the affinity"--use the value for Km given to you.

0 pts for not knowing what affinity is and writing all sorts of other formulas that one has never seen before.

7. (Total: 3pts)

7a. (1 pt)
- trait is not sex-linked.
- mutation is dominant.
- male was heterozygous.
- correct fruit fly notation.
(G/G+ or GE/GE+ or Ge/Ge+ or G/G+ where G = green eyes, G+ = red eyes.)

	G+	G+
G+	+/+	+/+
G	+/G	+/G

= 50% red, 50% green

So:
+ 1/2 pt for lowercase used for g+ allele (ex. g+/G or ge+/G)
+ 1/4 pt for heterozygote but trait written as recessive in correct notation (ex. g+/g)
+ 1/4 pt for wrong letter used for gene but mutation is heterozygous dominant (ex. R+/R, EC+/EC, W+/W or Xr/Y; G+/G or r+/R)
+ 1/4 pt for notation is incorrect but trait written as “G” and dominant heterozygote (ex. G+; G or G+G or Ge+Ge or GE+GE)

+ 0 pt for notation and letter used are incorrect and/or not dominant (ex. W+W or R+R or E+E or EC+EC or g+;g or Gg or green/red or Rr or a+a or Gr).
+ 0 pt for letter used incorrect and recessive trait and/or no + for w+ allele (ex. E/e+; GE/ge or r+/r or w+w or g/g or A/a or Re/re).
+ 0 pt for trait shown as sex-linked, incomplete dominance.

7b. (1 pt) No partial credit.

F1: Male green (G/G+) * Female green (G/G+)

	G+	G
G+	G+/G+	G+/G
G	G+/G	G/G

= 75% green eyes or 3/4

7c. (1 pt) No partial credit.

F1: Male red (G+/G+) * Female red (G+/G+)

	G+	G+
G+	+/+	+/+
G+	+/+	+/+

= 0% green eyes or 0

8. (Total: 4 pts)

+ 4 pts if answer = 0.0045, and work is correct.
+ 4 pts if 0.5 * 0.09, but work not shown for b. (If work is shown for D and e.)
+ 4 pts if used cross-branching in place of punnett square.
+ 4 pts if moved decimal (0.009), but other work shown.
+ 4 pts if * not written, but answer right. (Ex. 1/2 0.09 = 0.045)
+ 4 pts if b,D,e all in same punnett square, and answer is right. (Otherwise, no credit unless correct % shown.)
+ 2 pts if factored out, 0.5 * 0.04 + 0.5 * 0.04 + 0.5 * 0.08. (i.e. 1 pt for *, 1 pt for + 0 pt if 1/2 *, but no work for b.
+ 1 pt if both probabilities shown are wrong, and are multiplied, and the work is right. (Ex. 0.06 * 0.05)
+ 0 pt if 1/2 *, but no work shown.
+ 0 pt for empty punnett square with probabilities on rim.
+ 0 pt for 0.4 + 0.4 + 0.1.
+ 0 pts for adding instead of multiplying.
+ 0 pt if 0.04 & 0.04 * 0.01.
+ 0 pts if punnet square, but no (0.5 * 0.09).
- 1 pt if 1/work.
- 0 pts if 0.25 * 0.25 = 0.5 = “b” as long as punnett square shown and correct.
“b”, 0 pt for wrong D,e.)
- 0 pt if extra probabilities extra are multiplied in.
- 0 pt if multiplied 0.5 * 0.5 (unless full credit could be possible or unless 0.5 * 0.5 is labeled as “b”). (Ex. 0.5 * 0.5, 1 pt for 0.5, 1 for * = 2 total. If labeled “b,” then no pt.

Etc.
If multiplied, no part of 2 points 0.04 0.04 0.01.
If "b" punnett square not shown, but D,e squares shown and correct, 1 pt given for b (no pts off) i.e. "1/2" (unlabeled.)
If 2 arbitrary numbers are multiplied (and no work for the #'s is shown) then no 1 pt for the *. If some work, 1 pt for the *.
The derivation of probability "b" should be apparent. (Label "b = 1/2") or punnett square.

No partial credit for weird probabilities. (Ex. added too many, too few, wrong #'s.)

9. (Total: 4 pts)

+ 1 pt for each box = 4 pts total.

10. (Total: 3 pts)

+ 3 pts if linear or circular as long as students indicated the cut sites:

- 1 for pst1.
- 1 for ecor1.

(If linear, one enzyme had to be indicated at the end.)

+ 0 pts if students indicated anything other than 500 base pairs between cut sites.