

STE REVIEW 2 (scroll down for answers on web site)

- Richard recorded data on the three stable isotopes of a newly discovered element. Unfortunately, a coffee spill in the late hours of the night resulted in smudged data. Richard was able to recover data on the average atomic mass (24.72 a.m.u.), as well as data on the first two isotopes in the chart below.

Isotope	Natural abundance (%)
^{24}W	78.99
^{26}W	11.01
$^?\text{W}$?

What is the atomic mass of the missing isotope?

- While you are running, your body requires 2500 kJ/hr. It has been determined that 60% of this energy requirement is provided by the combustion of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) metabolized in your body.

The equation for the combustion of glucose is:



- How many grams of glucose will be metabolized during a two-hour run?
- The solubility of oxygen in water is only 7.6 mg/L at 20 °C. What volume of aqueous solution is needed for fish to metabolize 3.0 moles of glucose at this temperature?

3. What is the difference between transcription and translation? Mention molecules involved and location within the cell.

4. A pet store owner mated two black guinea pigs with the following results
-mostly black offspring
-a few white offspring

He then mated two of the white offspring and got the following results:
-all white offspring

- a) What is the genotype of the parents used in the first cross?
- b) What is the genotype of the parents used in the second cross?
- c) What is the chance of obtaining a totally homozygous offspring in the second cross?

5. What are the two genotypes that when crossed will yield the following genotypic ratio:



R = round
Y = yellow

- 6. a) How many chromosomes contain the allelic gene pair Rr?
- b) How many genes from "Rr" does a sex cell get from the parent?

Answers

1. $24(0.7899) + 26(0.1101) + 0.10x = 24.72$

Why 0.10?

10 % is the difference between the 100% and the other percentages.

$$x = 28.99800000 = 29$$

2.

You need 2500 kJ/hr (2 hr) = 5000 kJ

0.60(5000 kJ) = 3000 kJ will come from glucose

1mole/2816kJ* (3000 kJ) = 1.06 moles of glucose

1.06 moles C₆H₁₂O₆ (180 g/mole) = 190.8 g

3. 3 moles of C₆H₁₂O₆ (6 mol O₂/ 1 mol C₆H₁₂O₆) = 18 moles of oxygen

18 moles (32 g/mole) = 576 g O₂

576 g O₂ (L/0.0076g)=75780 L = 76000 L or 7.6 X 10⁴ L of water(2 SF only)

4. Transcription is the process by which genetic information is transmitted in the nucleus when mRNA forms on the surface of unwound DNA. The mRNA codes match up to the codes of the DNA and enough are copied so that the information of one gene is "copied".

















Translation is the process that assembles the protein from amino acids. The mRNA is attached to a ribosome and the amino acids are collected from the cytoplasm.

5. a) Bb, where B = dominant black gene: b = white recessive

b) bb

c) 100% and they will be all white.

6. RrYy X RrYy

		♂ gametes			
		$R Y$ $\frac{1}{4}$	$R y$ $\frac{1}{4}$	$r y$ $\frac{1}{4}$	$r Y$ $\frac{1}{4}$
♀ gametes	$R Y$ $\frac{1}{4}$	$RR YY$ $\frac{1}{16}$ 	$RR Yy$ $\frac{1}{16}$ 	$Rr Yy$ $\frac{1}{16}$ 	$Rr YY$ $\frac{1}{16}$ 
	$R y$ $\frac{1}{4}$	$RR Yy$ $\frac{1}{16}$ 	$RR yy$ $\frac{1}{16}$ 	$Rr yy$ $\frac{1}{16}$ 	$Rr Yy$ $\frac{1}{16}$ 
	$r y$ $\frac{1}{4}$	$Rr Yy$ $\frac{1}{16}$ 	$Rr yy$ $\frac{1}{16}$ 	$rr yy$ $\frac{1}{16}$ 	$rr Yy$ $\frac{1}{16}$ 
	$r Y$ $\frac{1}{4}$	$Rr YY$ $\frac{1}{16}$ 	$Rr Yy$ $\frac{1}{16}$ 	$rr Yy$ $\frac{1}{16}$ 	$rr YY$ $\frac{1}{16}$ 

9  : 3  : 3  : 1 

 Round, yellow

 Wrinkled, yellow

 Round, green

 Wrinkled, green

7. a) 2
b) 1