2020 Spring Cell Biology Midterm Answer Key

1	2	3	4	5	6	7	8	9	10
E	D	D	E	E	B	AB	H	C	E
11	12	13	14	15	16	17	18	19	20
C	D	C	C	C	E	C	D	E	A
21	22	23	24	25	26	27	28	29	30
B	D	D	BCAD	C	B	E	D	D	D
31	32	33	34	35	36	37	38	39	40
A	42351	C	B	E	E	FFFF	TTTF	TFTF	2331
41	42	43	44	45					
TTFF	FFFT	FTTF	CCEEE	SSRSS					

46	(a) Rough ER; (b) ER→vesicles coated by COP II (1.5)→ Golgi apparatus(1.5)→vesicles coated by Clathrin and AP (1.5)→ → endosome (1.5)→lysosome (c) Because the acid hydrolase works best at acidic pHs. During the transport process, the environment pH is around 7 and the hydrolase is not active. • Has to state the pH is too high or too low.
47	(a) mitochondria have own and independent DNA and protein synthesis machinery, with own RNA and ribosomes, and that they can self-replicate. (b) chloroplast
48	(a) SNAREs catalyze the many membrane fusion events in cells. They exist in pairs—a v-SNARE in the vesicle membrane that binds specifically to a complementary t-SNARE in the target membrane. (b) Rab proteins are monomeric GTPase in the Ras family present in plasma and organelle membranes in its GTP-bound state, and as a soluble cytosolic protein in its GDP-bound state. Rab proteins guide transport vesicles to their target membrane to confer specificity on vesicle docking.
49	Two Ran-specific regulatory proteins trigger the conversion between the two states: a **cytosolic GTPase-activating protein (GAP)** triggers GTP hydrolysis and thus converts Ran-GTP to Ran-GDP, and a **nuclear guanine exchange factor (GEF)** promotes the exchange of GDP for GTP and thus converts Ran-GDP to Ran-GTP. This gradient of the two conformational forms of Ran drives nuclear transport in the appropriate direction. Cargos with a **nuclear localization signal (NLS)** binds to the nuclear import receptor. Import receptors, facilitated by FG-repeat binding, then enter the channel. If the receptors arrive loaded with cargo molecules, the Ran-GTP will bind to them and the binding causes the receptors to release their cargo.

	Because the Ran-GDP in the cytosol does not bind to import (or export) receptors, unloading occurs only on the nuclear side of the NPC. In this way, the nuclear localization of Ran-GTP creates the directionality of the import process. Nuclear export occurs by a similar mechanism, except that Ran-GTP in the nucleus promotes cargo binding to the export receptor, rather than promoting cargo dissociation. Once the export receptor moves through the pore to the cytosol, it encounters Ran-GAP, which induces the receptor to hydrolyze its GTP to GDP. As a result, the export receptor releases both its cargo and Ran-GDP in the cytosol. Free export receptors are then returned to the nucleus to complete the cycle.
50	Glucose is pumped into the cell through the **apical** domain of the membrane by a **Na+-powered glucose symporter**. Glucose passes out of the cell (down its concentration gradient) by passive movement through a **glucose uniporter** in the **basal and lateral membrane** domains. The Na+ gradient driving the glucose symport is maintained by the **Na+-K+ pump** in the **basal and lateral plasma membrane** domains, which **keeps the internal concentration of Na+ low**. Adjacent cells are connected by impermeable tight junctions, which have a dual function in the transport process illustrated: they prevent solutes from crossing the epithelium between cells, allowing a concentration gradient of glucose to be maintained across the cell sheet. They also serve as diffusion barriers (fences) within the plasma membrane, which help confine the various transporters to their respective membrane domains.
51	Pinocytosis: cell drinking; type of endocytosis in which **soluble materials** are continually taken up from the environment in small vesicles and moved into endosomes along with the membrane-bound molecules Phagocytosis: Process by which **unwanted cells, debris, and other bulky particulate material** is endocytosed ("eaten") by a cell. Prominent in carnivorous cells, such as Amoeba proteus, and in vertebrate macrophages and neutrophils. In protozoa, phagocytosis is a form of feeding. Ex: Pinocytosis: Some animal viruses such as SV40 and papillomavirus enter cells, … Phagocytosis: macrophages or neutrophils engulf bacteria or virus, …
52	Actin-filaments-- myosin; Microtubules-- kinesin, dynein
53	Mitochondria inner membrane, chloroplast thylakoid membrane, bacteria plasma membrane; Use H+ gradient to synthesize ATP