Unit 24 · Reproductive System

ANSWER KEY · FOR TEACHERS

Full marks 32

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. Leydig
2. Sertoli
3. epididymis
4. seminal vesicles
5. corpus luteum
6. menarche
7. LH surge
8. vas deferens

K · 4

Each carries 0.5 mark.

2 Label the diagram

1. ovary
2. ovarian ligament
3. body of uterus
4. fundus
5. myometrium
6. cervix

K · 3

Each carries 0.5 mark.

3 Multiple choice

i. **a.** the seminal vesicles — K · 1

The **seminal vesicles** make about two-thirds of semen, with the fructose that fuels the sperms. The prostate makes about a quarter to a third; the sperms from the testes are under 5%, and the Cowper's glands only a few drops.

ii. **c.** the labia majora — K · 1

The **labia majora** and the scrotum grow from the same pair of swellings in the embryo. The clitoris is homologous to the penis, and Bartholin's glands to the Cowper's glands.

iii. **c.** progesterone from the corpus luteum — U · 1

The **secretory phase** matches the luteal phase of the ovary: **progesterone** from the corpus luteum makes the endometrium thick, soft, coiled and secreting, ready for an embryo. Estrogen from the follicle drives the proliferative phase before it.

iv. **c.** hCG from the embryo — U · 1

The implanting embryo secretes **human chorionic gonadotropin (hCG)**, which acts like LH. Without it, the corpus luteum would shrink after about two weeks, progesterone would fall and the lining with the embryo in it would be shed.

v. **c.** sperms — A · 1

A vasectomy cuts the **vas deferens**, the tube carrying sperms from the epididymis. Everything that joins the path after that point (the seminal vesicles' fluid, the prostate's, the Cowper's glands' mucus) still comes out; only the **sperms** don't.

4 Short answers

a. MARKING SCHEME — K · 2

- ✓ Sperm production needs a temperature 2–3 °C below the body's core.
- ✓ The scrotum keeps them cooler (thin, sweating skin; muscles adjust the distance).

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b. MARKING SCHEME U · 2

✓ Not fertilized: degenerates into the corpus albicans after 10–14 days.
✓ Fertilized: kept working by hCG until the placenta takes over.

c. MARKING SCHEME A · 2

✓ hCG, from the embryo.
✓ It keeps the corpus luteum making progesterone, so the endometrium isn't shed.

d. MARKING SCHEME U · 3

✓ Coiled tubules in lobules, with Leydig cells between them.
✓ Germinal epithelium: spermatogonia outside, later stages inward, sperms in the lumen.
✓ Sertoli cells nourish the sperms (and secrete inhibin).

5 Long answers

a. ANSWER U · 4

- **Follicular phase** (days 1–13): **FSH** makes a group of follicles grow; one becomes the **Graafian follicle**, which secretes rising **estrogen**.
- **Ovulation** (about day 14): high estrogen for about two days sets off the **LH surge**; the Graafian follicle bursts and releases the **secondary oocyte**.
- **Luteal phase** (days 15–28): under **LH** the empty follicle becomes the **corpus luteum**, which secretes **progesterone** (and some estrogen), holding back FSH and LH.
- Without fertilization the corpus luteum becomes the **corpus albicans** after 10–14 days; progesterone falls and FSH rises to start the next cycle.

MARKING SCHEME

✓ Follicular phase: FSH, a Graafian follicle, estrogen.
✓ Ovulation: LH surge releases the secondary oocyte.
✓ Luteal phase: corpus luteum makes progesterone under LH.
✓ Without fertilization it becomes the corpus albicans; FSH rises again.

b. ANSWER A · 4

- **Menstrual phase** (days 1–5): the corpus luteum has broken down, **progesterone and estrogen fall**, the spiral arteries tighten, and the upper endometrium dies and is shed with blood (about 30–40 ml).
- **Regenerative phase** (days 4–6): the **stratum basale** rebuilds a new surface lining.
- **Proliferative phase** (days 6–14): **estrogen** from the growing **Graafian follicle** makes the endometrium thicken to 3–5 mm, its glands straight and spiral arteries growing (the ovary's follicular phase).
- **Secretory phase** (days 15–28): **progesterone** from the **corpus luteum** makes it thick (5–7 mm), soft and rich in blood, its coiled glands secreting glycogen to feed an embryo (the ovary's luteal phase).

MARKING SCHEME

✓ Menstrual phase: hormones fall, endometrium shed.
✓ Regenerative phase: the stratum basale rebuilds the lining.
✓ Proliferative phase: estrogen from the follicle thickens the endometrium.
✓ Secretory phase: progesterone from the corpus luteum makes it secretory, ready for an embryo.

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6 Think

ANSWER HA · 3

A **vasectomy** only cuts the **vas deferens**: the testes still make sperms and **testosterone**, and the semen still flows, without sperms.
Testosterone, made by the **Leydig cells**, goes into the **blood**, not down the vas deferens, so it still reaches the body.
Castration removes the testes, the main source of testosterone, so the characters it keeps up (beard, muscle, deep voice, sex drive) weaken.

MARKING SCHEME

- ✓ Vasectomy blocks only the sperm duct; testes still make sperms and testosterone.
- ✓ Testosterone leaves through the blood, not the vas deferens.
- ✓ Castration removes the source of testosterone, so the secondary sexual characters weaken.

7 Activity: A 28-day cycle on a calendar

(not marked)

WHAT STUDENTS SHOULD FIND

Days 1–5 menstrual (ovary: start of the follicular phase; estrogen and progesterone low, FSH rising); days 6–14 proliferative (follicular phase; **estrogen**); about day 14 ovulation (**LH surge**); days 15–28 secretory (luteal phase; **progesterone**). Cycles of about **21 to 35 days** are normal in adults; the **follicular phase** varies most from woman to woman and month to month, while the luteal phase stays near 14 days.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	11	11	7	3	**32**

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