1. **OVULATION**

Ovulation is the release of secondary oocyte from the ovarian follicle. In a few days before ovulation, under the influence of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), the secondary follicle grows rapidly to become Graafian follicle. Coincident with final development of the vesicular follicle, there is an abrupt increase in which causes primary oocyte to complete meiosis I and follicle to enter the pre-ovulatory mature vesicular stage. Meiosis II is also initiated but the secondary oocyte is arrested in metaphase approximately three hours before ovulation. Meanwhile, the surface of the ovary begins to bulge locally at the apex, an avascular spot, the stigma appears. For the oocyte to be released, two events occur which are caused by LH surge. The events are;

* Increase in collagenase activity, resulting in digestion of collagen fibres surrounding the follicle.
* Increase in prostaglandin levels in response to the LH surge and cause local muscular contractions in the ovarian wall.

Those contractions extrude the oocyte which together with its surrounding follicular cells from the region of the cumulus oophorous. This causes ovulation in which oocyte floats out of the ovary. Some of the cumulus oophorous cells then rearrange themselves around the zona pellucida to form the corona radiate. Ovulation is triggered by a surge of LH production. Ovulation usually follows the LH peak by 12 – 24 hours. The LH surge, elicited by the high estrogen level in the blood, appears to cause the stigma to balloon out, forming a vesicle.

1. **DIFFERENCES BETWEEN MEIOSIS I AND MEIOSIS II**

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| **MEIOSIS I** | **MEIOSIS II** |
| Starts as diploid; ends as haploid | Starts as haploid; ends as haploid |
| Reductive division | Equational division |
| Homologous chromosome pairs separate | Sister chromatids separate |
| Crossing over happens | Crossing over does not happen |
| Complicated division process | Simple division process |
| Long duration | Short duration |
| Sister chromatids in prophase have convergent arms | Sister chromatids in prophase have divergent arms |
| Equatorial plane is centered | Equatorial plane is rotated 90° |
| Prophase split into 5 sub-phases | Prophase does not have sub-phases |
| Ends with 2 daughter cells | Ends with 4 daughter cells |

1. **STAGES INVOLVED IN FERTILIZATION**

* Penetration of Corona Radiata: It is done by releasing hyaluronidase from the acrosome to digest cumulus cells surrounding the oocyte and exposing acrosin attached to the inner membrane of the sperm. The [cumulus cells](https://en.wikipedia.org/wiki/Cumulus_oophorus) are embedded in a gel-like substance made primarily of hyaluronic acid, and developed in the ovary with the egg and support it as it grows. It is necessary for the acrosome reaction to occur before the sperm cell reaches the zona pellucida.
* Penetration of Zona Pellucida: Binding to ZP3 allows the sperm to adhere to the zona pellucida and is a critical step in fertilization. It triggers the sperm head to undergo the acrosome reaction. ... The sperm tail continues to beat vigorously, helping the sperm penetrate through the zona pellucida and make contact with the plasma membrane of the egg.The zona pellucida also releases Ca granules to prevent additional sperm from binding.
* Fusion of Plasma Membranes of Sperm and Oocyte: Acrosin digests the zona pellucida and membrane of the oocyte. Part of the sperm's cell membrane then [fuses](https://en.wikipedia.org/wiki/Fertilization) with the egg cell's membrane, and the contents of the head sink into the egg. The fusion of sperm and oocyte takes place in the microvilli-rich region.The interaction between sperm and oocyte is preceded by acrosomal exocytosis, triggered by sperm and ZP binding. It involves sperm attachment to the oocyte and cell-cell adhesion, leading to membrane fusion of the two gametes.
* Completion of Second Meiotic Division: Second meiotic division in female egg do not get completed before the entry of sperm. Hence, second meiotic division takes place after ovulation, inside fallopian tube. As the sperm head enters egg cytoplasm, second meiotic division proceeds to its final phase, giving out a second polar body.
* Formation of The Female and Male Pronuclei: The female pronucleus is the female egg cell once it has become a haploid cell, and the male pronucleus forms when the sperm enters into the female egg. While the sperm develops inside of the male testes, the sperm does not become a pronucleus until it decondenses quickly inside of the female egg.
* Formation of Zygote: The female pronucleus will fuse with the male pronucleus to form ootid which eventually becomes a zygote.

1. **DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS**

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| **MONOZYGOTIC TWINS** | **DIZYGOTIC TWINS** |
| A zygote divides into two. | Two different sperms fertilize two different eggs. |
| They are genetically identical. | They are genetically unidentical. |
| They look alike. | They do not look alike. |
| They have the same sex. | They can be of different sexes. |
| They share the same placenta, chorionic sac and amionic sac. | They have separate placenta, chorionic sac and amionic sac. |