# Obstetrics & Gynecology- Specific PDA: A Resident Gadget

**Mechanical adaptor for integrated MIC to reduce noise and focus sound** In the
Name of God

# Obstetrics & Gynecology- Specific PDA: A Resident Gadget

**Mechanical adaptor for integrated MIC to reduce noise and focus sound**

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# Contents:

OBS and GYN exam review

OBS and GYN routine orders

Decision Making for Common Medical Disorders


*To my dear Kei,*


**For a better care of ALL MOTHERS**

## MICHIGAN STATE
### UNIVERSITY

February 25, 2007

Mitra Ahmad Soltani, MD
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Dear Dr. Soltani,

Thank you for submitting your manuscript titled "Gestational Age Calculation" to *Medical Education Online*. It has been included in the Curriculum and Teaching Materials Subsection of our Resource Section. We greatly appreciate your support of the Journal.

Sincerely,

David J Solomon, PhD
Founding Editor,
Medical Education Online

COLLEGE OF
**HUMAN MEDICINE**
Office of Medical
Education Research
and Development
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**به نام خدا**

# چکیده:

به طور اجمالی این طرح دستگاهی با اندازه یک موبایل با صفحه نمایش است که توسط آن می توان ثبت ضربان قلب جنین ، محاسبه سن بارداری بر حسب هفته ، مرور دروس زنان و زایمان را علاوه بر عملیات یک کامپیوتر جیبی انجام داد . همچنین در این دستگاه الگوریتم های تصمیم گیری و داروهای مصرفی با دوز در مورد بیماریهای شایع طراحی شده است.

1- در مورد سمع ضربان قلب جنین دو ابزار در اطاق زایمان وجود دارد:

اول پینارد یا گوشی مامایی وسیله ایی است که برای سمع صدای قلب جنین بکار می رود و بواسطه کوتاه بودن طول آن ، صورت در مقابل محل آلوده و بد بو محل خروج جنین قرار می گیرد.

دوم:دستگاه سونیک اید ( وسیله نسبتا گرانقیمت با کاربرد واحد) که دارای پروب است که روی شکم مادر قرار می گیرد . در این دستگاه ولتاژ 220 ولت به ولتاژی حدود 5 ولت تبدیل شده و امواج با فرکانس ورای فرکانسهای شنیداری (برای پروب جنین حدود 3-4 مگا هرتز) به داخل مایع آمنیوتیک هدایت می شود و سپس طبق قانون داپلر موج برگشتی با تغییر فرکانس توسط همان پروب دریافت شده و با فرکانس حدود350 هرتز به بلندگو ارسال می شود. در بخش زایمان یک یا دو سونیک اید وجود دارد که کل پرسنل از آن استفاده میکنند. پیدا کردن و حمل آن سخت است ، نیاز به ماده لوبریکانت دارد و اغلب اوقات بواسطه پارازیت مشکل ساز است.

با طرح اداپتور تبدیل میکروفون درونی به میکروفون خارجی می توان بطور مکانیکی صوت را توسط گوشی پزشکی به کامپیوتر جیبی وارد کرد تا در آنجا با برنامه های کامپیوتری صوتی تمرکز صوت و حذف اصوات اضافی را انجام داد. گوشی پزشکی کوچک است و نیاز به برق و ماده لوبریکانت ندارد. در نتیجه این کامپیوتر جیبی کوچک میتواند قابلیت تشدید صوت و نمایش در لحظه و ضبط را پیدا کند.

این ابزار دستگاه کوچک چند منظوره است که در جیب قابل حمل است و با باطری قابل شارژ کار می کند و از آن علاوه بر کاربردهای روزمره ( ضبط صدا- پخش– دفتر تلفن- کرونومتر -جابجا کردن فایل با برنامه بلوتوث) می توان به صورت سونیک اید استفاده کرد. در ضمن چون خروجی به صورت تصویر روی نمایشگر ظاهر می شود پارازیت ناشی از کنار هم قرار گرفتن میکروفون و بلند گو بوجود نمی آید.

2- محاسبه سن بارداری بر حسب هفته با تقویم ایرانی ( که قابل تبدیل به تقویم گریگوریان هم هست) از کاربردهای دیگر این دستگاه کوچک است.

در رشته زنان و زایمان اساسی ترین سوالات در گرفتن شرح حال پرسش چهار سوال زیراست:

1- سن زن باردار

2- دفعات بارداری ، دفعات زایمان ، دفعات سقط، تعداد بچه زنده و فوت شده

3-شروع آخرین قاعدگی

4- سن بارداری

جهت محاسبه سن بارداری فاصله تاریخ شروع آخرین قاعدگی را از زمان حال محاسبه می کنند. مثلا اگر آخرین قاعدگی تاریخ 84/11/11 باشد و خانم باردار در تاریخ 85/5/10 مراجعه کرده باشد به طور سر انگشتی 26 هفته و 1 روز محاسبه می شود. لازم به ذکر است که سن بارداری در حرفه زنان و مامایی بر حسب هفته بیان می شود زیرا وقایع مهم زندگی جنینی در هفته های خاص بارداری برای صاحبان فن شناخته شده است. مثلا قلب جنین از هفته 8 شروع به طپش می کند یا اینکه مرگ جنین زیر هفته بیست ، سقط نام دارد ولی بعد از بیست هفته مرگ جنینی نامیده میشود یا آنکه سزارین تکراری بعد از رسیده شدن ریه جنین صورت می گیرد (یعنی هفته 37-38).

محاسبه سن بارداری از وقت گیرترین بخشهای گرفتن شرح حال است و به همین واسطه احتمال خطا در این محاسبه زیاد است، خطاهایی که می تواند مسائل و پیگردهای قانونی به همراه داشته باشد. به همین جهت روشهای مختلفی برای تسهیل این امرمهم طراحی شده است. نمونه این روشها قانون نگل است که تاریخ زایمان را با فرمول زیر محاسبه می کند:از مورخ شروع آخرین قاعدگی ، سه ماه کم و هفت روز به آن اضافه می کنند. مثلا در مورد مثال بالا خانمی که آخرین دوره قاعدگی 84/11/11 داشته ، باید در تاریخ 85/8/18 زایمان کند. به تاریخ 8/18 اصطلاحا EDC (Estimated date of Confinement ) می گویند.

همانطور که مشخص است این محاسبه ساده نمی تواند سن حاملگی را در تاریخ 85/5/10 یا هر زمان دیگر بدست بدهد.

روش دیگر استفاده از تقویم های محاسبه زمان زایمان است که آنهم برای تعیین تاریخ EDC است. اشکال محاسبه سن بارداری با فرمول آن است که شش ماه از سال 31 روزه است و شش ماه دیگر 30 روزه . بعلاوه اسفند می تواند دو مقدار 30 یا 29 روز را داشته باشد و برای همین ارائه یک فرمول ساده بدون" تبصره" و " اگر" امکان ندارد.

در کتب مامایی مرجع از چرخهای محاسبه حاملگی و تقویم محاسبه زایمان هم ذکر به میان آمده که آنها نیز با احتمال خطای یک تا دو روز زمان زایمان را ( آنهم بر حسب ماه تقویمهای گریگوریان) محاسبه می کنند نه سن بارداری را. این دستگاه می تواند با دقت ± یک روزعلاوه بر صرفه جویی زمانی بر دقت محاسبه سن بارداری بر حسب هفته بیافزاید قابل استفاده برای کاربر ایرانی است.

3- همچنین از مزایای دیگر این ابزار کوچک امکان مرورخلاصه دروس و تستهای زنان و زایمان است .

لازم به ذکر است که الگوریتم محاسبه سن بارداری و همچنین تهیه اسلایدها و ترجمه و تالیف متون از فارسی به انگلیسی توسط اینجانب بوده است که در سایت دانشکده پزشکی دانشگاه میشگان بعنوان منبع برای دانشجویان پزشکی انگلیسی زبان مورد استفاده است.

همچنین دو ابزار "محاسبه سن بارداری" و " ادپتور تبدیل میکروفون داخلی به خارجی" بعنوان اختراع مولف در اداره ثبت شرکتها و مالکیت صنعتی با شماره 38512335و 39571 ثبت شده است.

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## Obstetrics and Gynecology Specific PDA: A Resident Gadget Introduction

**Where is the innovation?!**

This is a PDA device with its price (350,000 Tomans) and applications. But what is added to it?

1- OBS and GYN orders, texts summaries and exam questions in power point format. The contents are exclusively designed for readability in a PDA. I wrote the slides based on Iran's OBS and GYN reference books.

2- General medicine decision making algorithms, questions and cases in PPT slides. Again the content is based on Iran's reference books for Residency Entrance Exam.

3- An innovation about an adaptor to provide an input jack for pocket pc.

4-Programming of Excel files to provide a Data Sheet that can calculate gestational age and BMI.

5-Thinklabs phonocardiography and real time RTA software modified to provide objective visual and saving properties for fetal and maternal heart sounds.

**Why a PDA is needed for OBS and GYN profession?**

In a busy OBS& GYN ward   it looks quite imperative that a resident be equipped with some tools to facilitate doing her duties. The manifold tasks can consist of:

- taking history,

-doing physical examinations,

- calculating gestational age based on the last menstrual period,

-checking fetal heartbeat,

- taking notes,

-communicating with all members of an OBS and GYN team,

And more:

- On occasions she needs documented evidence for orders. As residency tasks are done according to ranks, it is probable that a Senior orders a therapy to be implemented by a Junior which later turns out to be out of texts or according to negligence. Introduction of a recording device can reduce the rate of denial and mismanagements accordingly.

-Time is an important issue in all surgery wards and OBS and GYN is not an exception. A resident should go through tasks as fast and accurate as the senior resident or attending professor demands. And this all has to be done 100 times a shift.

–If not busy by flooding pregnant women inside the maternity hospital, the resident needs to take a look on her notes and exam questions.

-On the occasion that she feels her eyes need a rest, she can close them and listen to the morning reports or lectures presented.

# First application:

**Introducing an External MIC jack to a PDA with a built-in MIC**:

Electronic sonic aid has an advantage over traditional Pinards because it can give a fairly objective proof about FHR abnormalities. Yet, it is usually full of noise and its application to have a clear sound of fetal heart beat in the second stage of labor among the woman's screams and the crowded delivery room is troublesome.  Pocket size sonic aids are available commercially with expensive prices in Iran and limited utilities. By real time RTA the sonic aid sent sounds can be traced and counted more easily. By suggested adaptor, the integrated MIC can be changed to an external MIC jack to provide focus and reduce noise.

PDA costs half the price of a sonic aid with lots of other utilities.

Even an ordinary stethoscope can be heard by a PDA MIC once a neoprene tube is attached to microphone port on the top of a PDA from one end and to a diaphragm of a stethoscope to another end.  After pressing the power button on the top of the unit to turn on PDA and fixing the tube by some grips (one is designed here, but any kind of grip or clips is fine) the fetal heart tone or mother's heart tone can be shown by RTA or recorded.  The recorded file can later be viewed and analyzed by Phonocardiography software for Windows.

**Picture1 – integrated MIC on the top of the PDA**



**The integrated MIC**

**Picture2-neoprene tube and its grip on the top of the PDA**



The front aspect of the PDA with tube attached
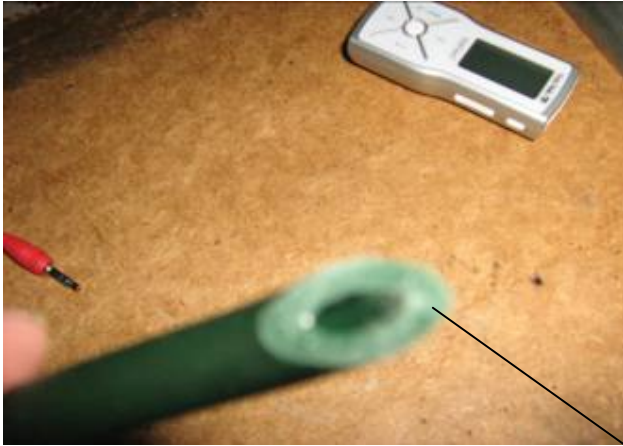
The tip of the neoprene tube cut in an oval shape

**Picture 3:  Stethoscope and neoprene tube functioning as an external microphone**



**Picture4: the components of the grip and the rear aspect of the PDA:**

The head of the grip

The beam of the grip

The tip of the neoprene tube

The beam attachment on the rear aspect of the PDA
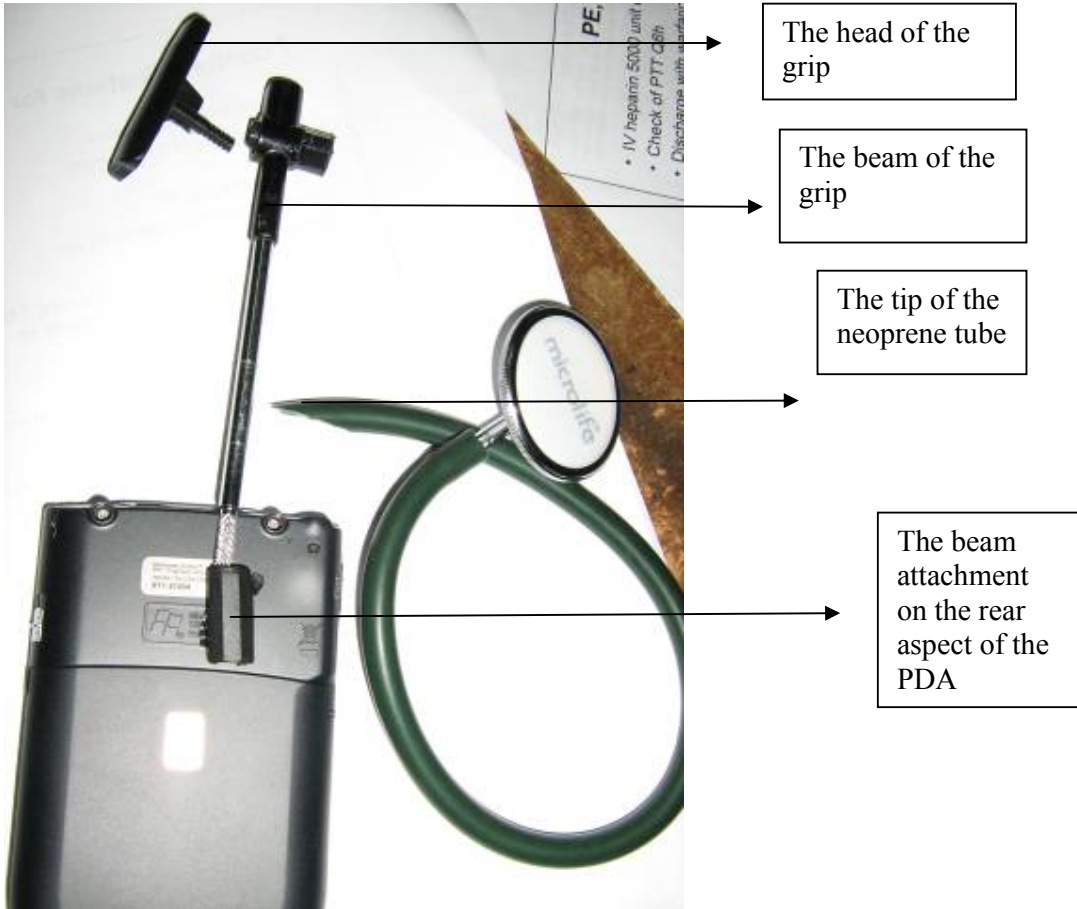
**Diagram1: Thinklabs Phonocardiography Freeware. Tools include spectral analysis (FFT), tone generation and speech synthesis.**
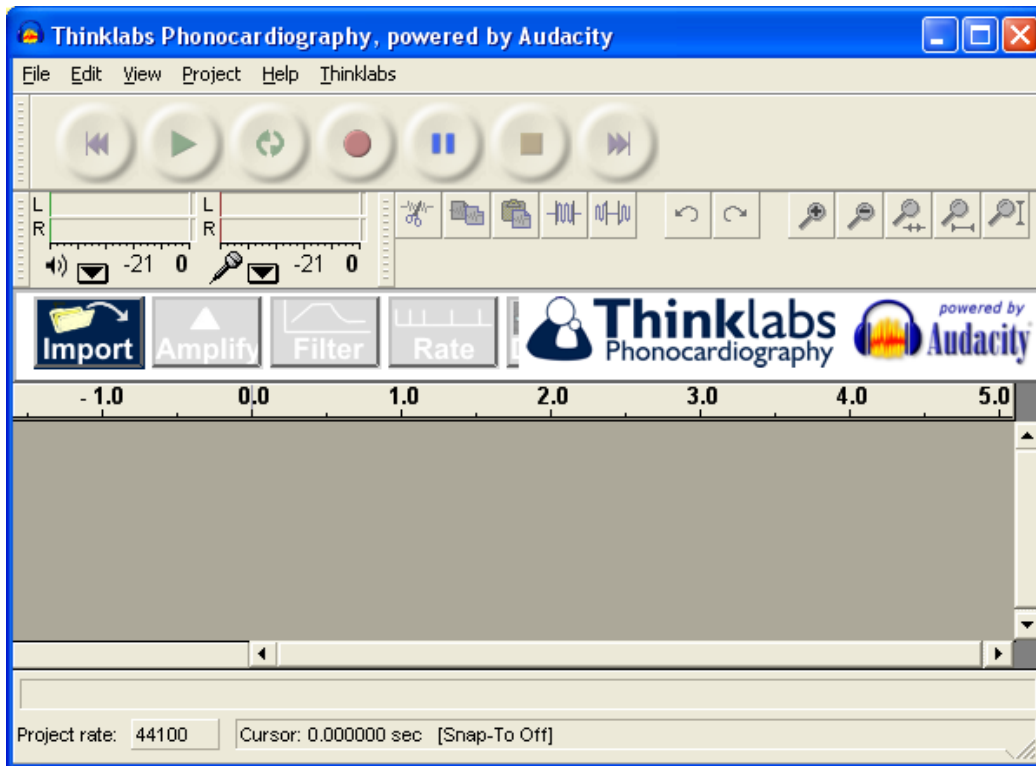
**Diagram2- RTA Demo Freeware takes one minute sample of the sounds picked up by the built-in microphone on the Pocket PC. It then applies a Fourier Transform to the samples, and obtains their frequency spectrum (for more detailed description see appendix section)**
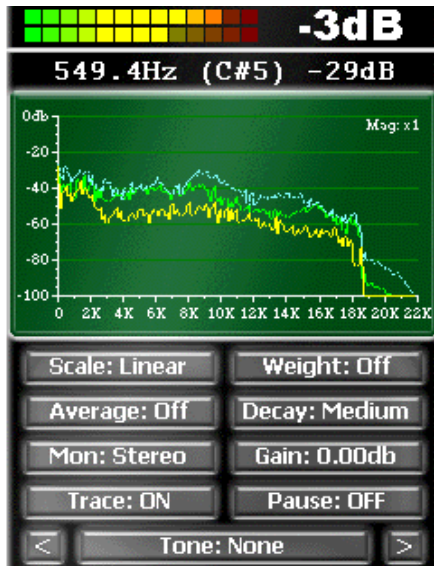
# Second application:

**Gestational age calculation:**

As days of a year are composed of a heterogeneous combinations of numbers (like six months of 31 days, one month of 29 days which is 30 days every 4 years), introducing a simple, straight forward formula is practically impossible. The Obstetrics rule that gestational age should be presented in weeks +days adds to the complexity. The following algorithm is what goes on in an Excel program installed in windows mobiles. Gestational age is calculated in weeks based on Last Menstrual Period date and the date of visit.

First we have two dates:

LMP: like 85/12/3 Iran's calendar (which is 2007/Feb/22), and the date the woman comes to clinic like 86/ 4/2. We consider the beginning and the end months, with three months in between. The **difference of days** is calculated based on table 1.

If the number falls in the highlighted zone (yellow numbers), one month is added to the LMP; in this example 85/12/3 would change to 85/1/3. The difference of the days is 29 days. If the number falls in the non-highlighted zones, the month of LMP wouldn't be changed.

1- **The difference of months between LMP and visit** is calculated according to table 2.

According to the LMP of 85/12/3 (here it changed to 86/**1**/3) and visit on 86/**4**/2, the table shows there are 3 months (12 weeks) / plus 3 months of 31 days in between.

2- Now we have 32 days (29+3) and 12 weeks. Going to the column of three (12 weeks), we reach the number 32. Then we read the number on the red-lighted column that is 5w+3d.

3- So the final number of gestational age would be 17w+3d.

4- If the month of 12 is 29 days, the gestational age is 17w+2 d, and if it is 30 days, GA is 17w+3d.

**Table1- The vertical column is for LMP and the horizontal column is for the day of visit.**

| | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 |
| 3 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 |
| 4 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 |
| 5 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 |
| 6 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 |
| 7 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 |
| 8 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 |
| 9 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 |
| 10 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 |
| 11 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 |

| 12 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 |
| 14 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 |
| 15 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| 16 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 |
| 17 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 |
| 18 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 |
| 20 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 |
| 21 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |
| 22 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
| 23 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 |
| 24 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 |
| 25 | 5 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 |
| 26 | 4 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 |
| 27 | 3 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 |
| 28 | 2 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 |
| 29 | 1 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 |
| 30 | 0 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

**Table2-LMP month (high lighted) and Visit month/ number of 31- day months between LMP and Visit**

| LMP | Visit/ no of 31-day months between LMP and Visit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8/7 | 5/4 | 2/1 | 9/6 | 6/5 | 3/2 | 10/6 | 7/6 | 4/3 |
| 2 | 9/6 | 6/4 | 3/1 | 10/5 | 7/5 | 4/2 | 11/5 | 8/5 | 5/3 |
| 3 | 10/5 | 7/4 | 4/1 | 11/4 | 8/4 | 5/2 | 12/4 | 9/4 | 6/3 |
| 4 | 11/4 | 8/3 | 5/1 | 12/3 | 9/3 | 6/2 | 1/3 | 10/3 | 7/3 |
| 5 | 12/3 | 9/2 | 6/1 | 1/2 | 10/2 | 7/2 | 2/3 | 11/2 | 8/2 |
| 6 | 1/1 | 10/1 | 7/1 | 2/2 | 11/1 | 8/1 | 3/3 | 12/1 | 9/1 |
| 7 | 2/1 | 11 | 8 | 3/2 | 12 | 9 | 4/3 | 1 | 10 |
| 8 | 3/2 | 12 | 9 | 4/3 | 1 | 10 | 5/4 | 2/1 | 11 |
| 9 | 4/3 | 1 | 10 | 5/4 | 2/1 | 11 | 6/5 | 3/2 | 12 |
| 10 | 5/4 | 2/1 | 11 | 6/5 | 3/2 | 12 | 7/6 | 4/3 | 1 |

| | 6/5 | 3/2 | 12 | 7/6 | 4/3 | 1 | 8/6 | 5/4 | 2/1 |
|---|---|---|---|---|---|---|---|---|---|
| **11** | 6/5 | 3/2 | 12 | 7/6 | 4/3 | 1 | 8/6 | 5/4 | 2/1 |
| **12** | 7/6 | 4/3 | 1 | 8/6 | 5/4 | 2/1 | 9/6 | 6/5 | 3/2 |
| **\*\*\*\*** | 7(30W) | 4(17w) | 1(4w) | 8(34W) | 5(21W) | 2(8W) | 9(38) | 6(25W) | 3(12W) |
| **5w+4** | 39 | 38 | 37 | 37 | 36 | 35 | 35 | 34 | 33 |
| **5w+3** | 38 | 37 | 36 | 36 | 35 | 34 | 34 | 33 | 32 |
| **5w+2** | 37 | 36 | 35 | 35 | 34 | 33 | 33 | 32 | 31 |
| **5w+1** | 36 | 35 | 34 | 34 | 33 | 32 | 32 | 31 | 30 |
| **5w** | 35 | 34 | 33 | 33 | 32 | 31 | 31 | 30 | 29 |
| **4w+6** | 34 | 33 | 32 | 32 | 31 | 30 | 30 | 29 | 28 |
| **4w+5** | 33 | 32 | 31 | 31 | 30 | 29 | 29 | 28 | 27 |
| **4w+4** | 32 | 31 | 30 | 30 | 29 | 28 | 28 | 27 | 26 |
| **4w+3** | 31 | 30 | 29 | 29 | 28 | 27 | 27 | 26 | 25 |
| **4w+2** | 30 | 29 | 28 | 28 | 27 | 26 | 26 | 25 | 24 |
| **4w+1** | 29 | 28 | 27 | 27 | 26 | 25 | 25 | 24 | 23 |
| **4w** | 28 | 27 | 26 | 26 | 25 | 24 | 24 | 23 | 22 |
| **3w+6** | 27 | 26 | 25 | 25 | 24 | 23 | 23 | 22 | 21 |
| **3w+5** | 26 | 25 | 24 | 24 | 23 | 22 | 22 | 21 | 20 |
| **3w+4** | 25 | 24 | 23 | 23 | 22 | 21 | 21 | 20 | 19 |
| **3w+3** | 24 | 23 | 22 | 22 | 21 | 20 | 20 | 19 | 18 |
| **3w+2** | 23 | 22 | 21 | 21 | 20 | 19 | 19 | 18 | 17 |
| **3w+1** | 22 | 21 | 20 | 20 | 19 | 18 | 18 | 17 | 16 |
| **3w** | 21 | 20 | 19 | 19 | 18 | 17 | 17 | 16 | 15 |
| **2w+6** | 20 | 19 | 18 | 18 | 17 | 16 | 16 | 15 | 14 |
| **2w+5** | 19 | 18 | 17 | 17 | 16 | 15 | 15 | 14 | 13 |
| **2w+4** | 18 | 17 | 16 | 16 | 15 | 14 | 14 | 13 | 12 |
| **2w+3** | 17 | 16 | 15 | 15 | 14 | 13 | 13 | 12 | 11 |
| **2w+2** | 16 | 15 | 14 | 14 | 13 | 12 | 12 | 11 | 10 |
| **2w+1** | 15 | 14 | 13 | 13 | 12 | 11 | 11 | 10 | 9 |
| **2w** | 14 | 13 | 12 | 12 | 11 | 10 | 10 | 9 | 8 |
| **1w+6d** | 13 | 12 | 11 | 11 | 10 | 9 | 9 | 8 | 7 |
| **1w+5d** | 12 | 11 | 10 | 10 | 9 | 8 | 8 | 7 | 6 |
| **1w+4d** | 11 | 10 | 9 | 9 | 8 | 7 | 7 | 6 | 5 |
| **1w+3d** | 10 | 9 | 8 | 8 | 7 | 6 | 6 | 5 | 4 |
| **1w+2d** | 9 | 8 | 7 | 7 | 6 | 5 | 5 | 4 | 3 |
| **1w+1d** | 8 | 7 | 6 | 6 | 5 | 4 | 4 | 3 | 2 |
| **1W** | 7 | 6 | 5 | 5 | 4 | 3 | 3 | 2 | 1 |
| **6** | 6 | 5 | 4 | 4 | 3 | 2 | 2 | 1 | 3(12w) |
| **5** | 5 | 4 | 3 | 3 | 2 | 1 | 1 | 6(25w) | |
| **4** | 4 | 3 | 2 | 2 | 1 | 2(8w) | 9(38w) | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **3** | 3 | 2 | 1 | 1 | 5(21w) | | | | |
| **2** | 2 | 1 | 1(4w) | 8(34w) | | | | | |
| **1** | 1 | 4(17w) | | | | | | | |

**Table3- list of variables**

**E=LMP month (vertical column)**

**N=number of weeks**

**G=number of days added**

**H= number of 31- day months between LMP and Visit**

| | N=30 G=0 | N=17 G=1 | N=4 G=2 | N=34 G=2 | N=21 G=3 | N=8 G=4 | N=38 G=4 | N=25 G=5 | N=12 G=6 |
|---|---|---|---|---|---|---|---|---|---|
| E=1 | C=8 H=7 | C=5 H=4 | C=2 H=1 | C=9 H=6 | C=6 H=5 | C=3 H=2 | C=10 H=6 | C=7 H=6 | C=4 H=3 |

23

| E=2 | C=9 H=6 | C=6 H=4 | C=3 H=1 | C=10 H=5 | C=7 H=5 | C=4 H=2 | C=11 H=5 | C=8 H=5 | C=5 H=3 |
|---|---|---|---|---|---|---|---|---|---|
| E=3 | C=10 H=5 | C=7 H=4 | C=4 H=1 | C=11 H=4 | C=8 H=4 | C=5 H=2 | C=12 H=4 | C=9 H=5 | C=6 H=3 |
| E=4 | C=11 H=4 | C=8 H=3 | C=5 H=1 | C=12 H=3 | C=9 H=3 | C=6 H=2 | C=1 H=3 | C=10 H=3 | C=7 H=3 |
| E=5 | C=12 H=3 | C=9 H=2 | C=6 H=1 | C=1 H=2 | C=10 H=2 | C=7 H=2 | C=2 H=3 | C=11 H=2 | C=8 H=2 |
| E=6 | C=1 H=1 | C=10 H=1 | C=7 H=1 | C=2 H=2 | C=11 H=1 | C=8 H=1 | C=3 H=2 | C=12 H=1 | C=9 H=1 |
| E=7 | C=2 H=1 | C=11 | C=8 | C=3 H=2 | C=12 | C=9 | C=4 H=3 | C=1 | C=10 |
| E=8 | C=3 H=2 | C=12 | C=9 | C=4 H=3 | C=1 | C=10 | C=5 H=4 | C=2 H=1 | C=11 |
| E=9 | C=4 H=3 | C=1 | C=10 | C=5 H=4 | C=2 H=1 | C=11 | C=6 H=5 | C=3 H=2 | C=12 |
| E=10 | C=5 H=4 | C=2 H=1 | C=11 | C=6 H=5 | C=3 H=2 | C=12 | C=7 H=6 | C=4 H=3 | C=1 |
| E=11 | C=6 H=5 | C=3 H=2 | C=12 | C=7 H=6 | C=4 H=3 | C=1 | C=8 H=6 | C=5 H=4 | C=2 H=1 |
| E=12 | C=7 H=6 | C=4 H=3 | C=1 | C=8 H=6 | C=5 H=4 | C=2 H=1 | C=9 H=6 | C=6 H=5 | C=3 H=2 |

**Diagram3: The algorithmic steps of gestational age calculation**

```
Input
A=LMP month
B=LMP day
C=visit month
D=visit day
Output
How many weeks (P)
How many days? (L)
```

```
If D>=B
Then: A=E
F=D-B
```

```
If: D<B
Then A+1=E

If A=12
Then: E=1
F= (30-B)+D
```
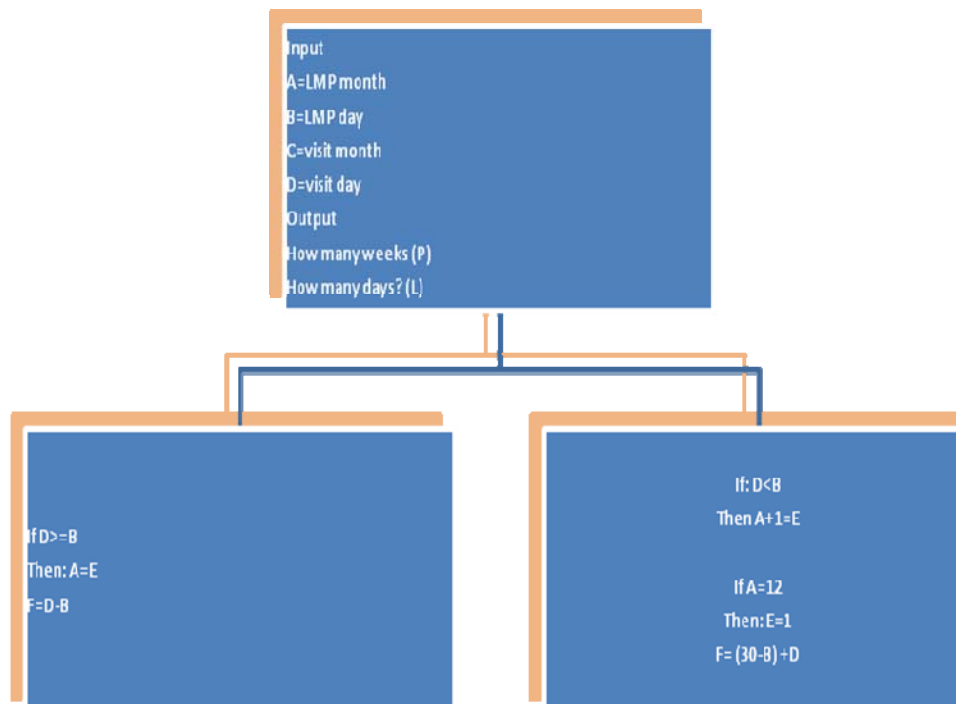
K, F, G, H, L, M, N mean:

K=F+G+H

K/7=M+ remainder of K/7

L=(MOD)remainder of K/7

P=M+N

**Picture5: Gestational age calculation tool. If an electronic device is not available you can use this abacus –like tool to calculate number of weeks and days between two dates based on Persian calendar.**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12 | 4+2 | 8+5 | 13+1 | 17+4 | 22 | 26+3 | 30+6 | 35+1 | 39+3 |
| 11 | 4+2 | 8+4 | 13 | 17+3 | 21+6 | 26+2 | 30+5 | 35+1 | 39 3 |
| 10 | 4+2 | 8+4 | 12+6 | 17+2 | 21+5 | 26+1 | 30+4 | 35 | 39+3 |
| 9 | 4+2 | 8+4 | 12+6 | 17+1 | 21+4 | 26 | 30+3 | 34+6 | 39+2 |
| 8 | 4+2 | 8+4 | 12+6 | 17+1 | 21+3 | 25+6 | 30+2 | 34+5 | 39+1 |
| 7 | 4+2 | 8+4 | 12+6 | 17+1 | 21+3 | 25+5 | 30+1 | 34+4 | 39 |
| 6 | 4+3 | 8+5 | 12+6 | 17+2 | 21+4 | 25+6 | 30+1 | 34+4 | 38+6 |
| 5 | 4+3 | 8+6 | 13 | 17+3 | 21+5 | 26 | 30+3 | 34+4 | 39 |
| 4 | 4+3 | 8+6 | 13+2 | 17+4 | 21+6 | 26+1 | 30+4 | 34+5 | 39 |
| 3 | 4+3 | 8+6 | 13+2 | 17+5 | 22 | 26+2 | 30+5 | 34+6 | 39+1 |
| 2 | 4+3 | 8+6 | 13+2 | 17+5 | 22+1 | 26+3 | 30+6 | 35 | 39+2 |
| 1 | 4+3 | 8+6 | 13+2 | 17+5 | 22+1 | 26+4 | 31 | 35+1 | 39+3 |

It is easy to work as the month of LMP is added by one and is found on the vertical column on the left. The month of referral is defined by color. The crossing of these two columns is the number of weeks and days between LMP and referral months.

The number of weeks and days between LMP and referral days is calculated by the wheel shown at the bottom of the board in picture 5.

Some software calculates Gestational age for Gregorian calendars. But PDA Excel for mobile program can be programmed to calculate this function.

Excel for mobile can facilitate calculations in OBS (Gestational calculations, Body-Mass Index) plus providing a tool to collect and record data about patients.

**Diagram 4- Microsoft Excel programmed for OBS and GYN data collections and calculations**
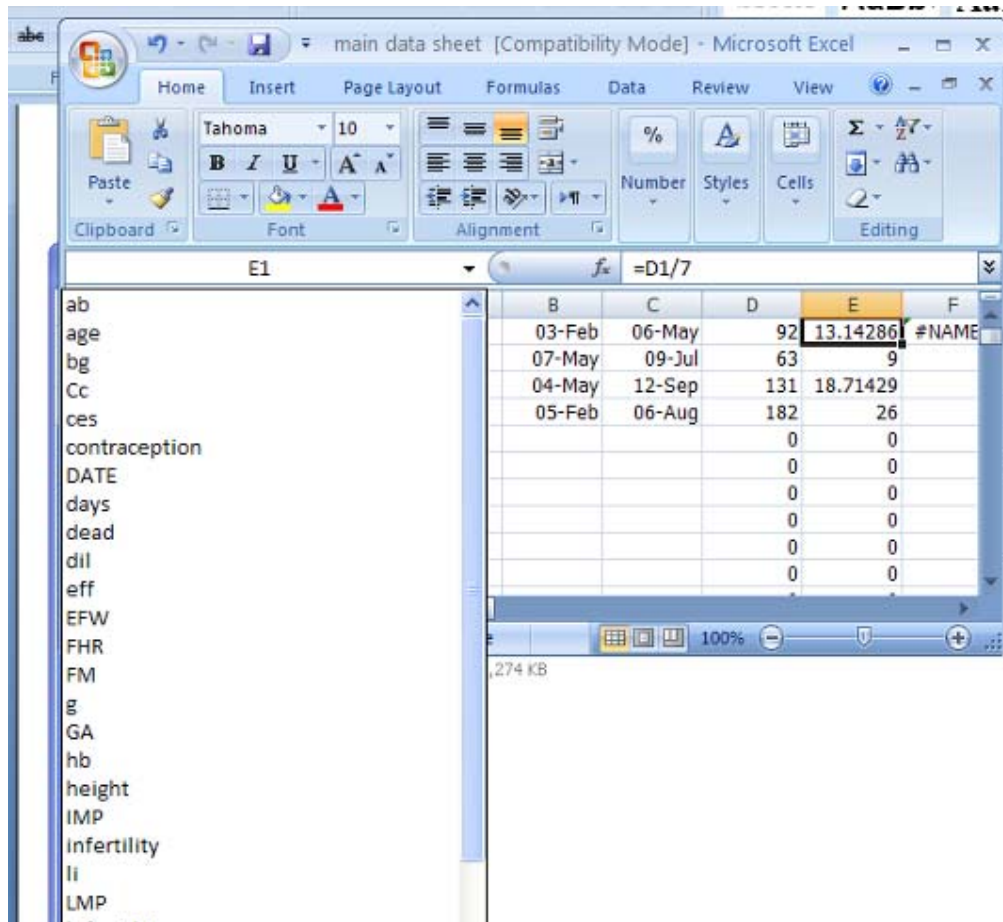
Calculator and data collection sheet:

To access Excel Mobile, tap : START>PROGRAMS>EXCEL MOBILE.

The preprogrammed file will calculate gestational age once the LMP and referral dates are entered into the chart. This also is the case for calculation of BMI. Once the weight and height are typed in related columns BMI is automatically calculated.

# Third application

## Reviews:

To view power point slides or word doc files, tap START>PROGRAMS> power point or word doc files.

## Diagram 5- Power point slides for review of OBS and GYN texts, questions and orders
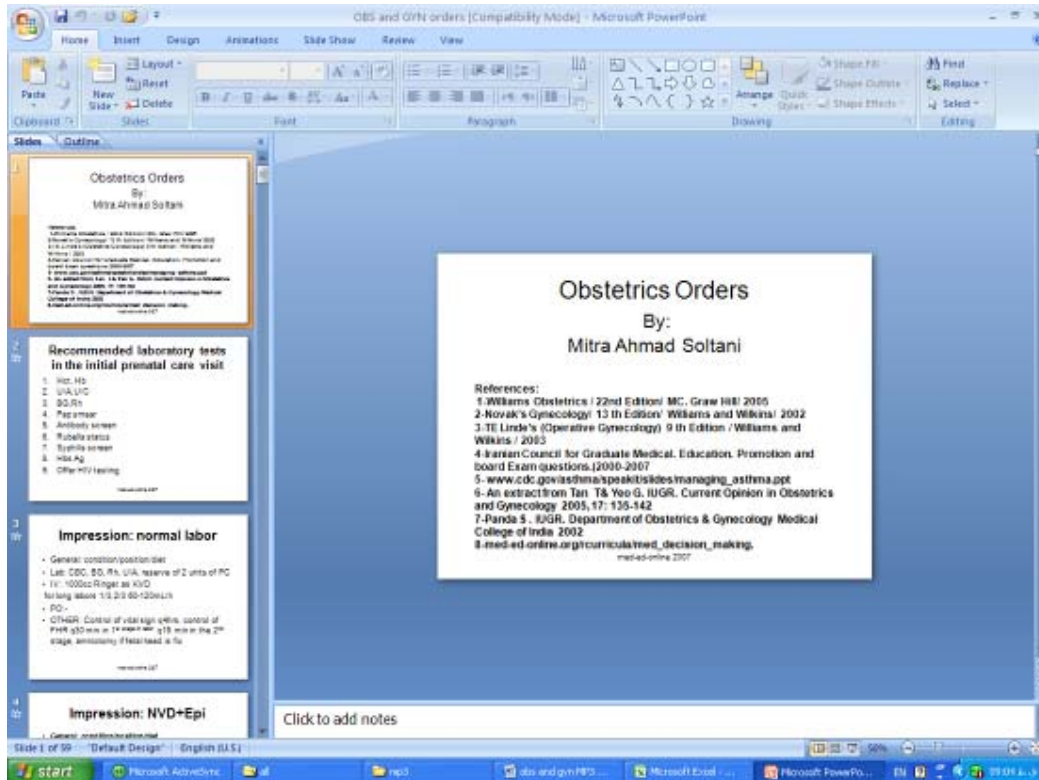
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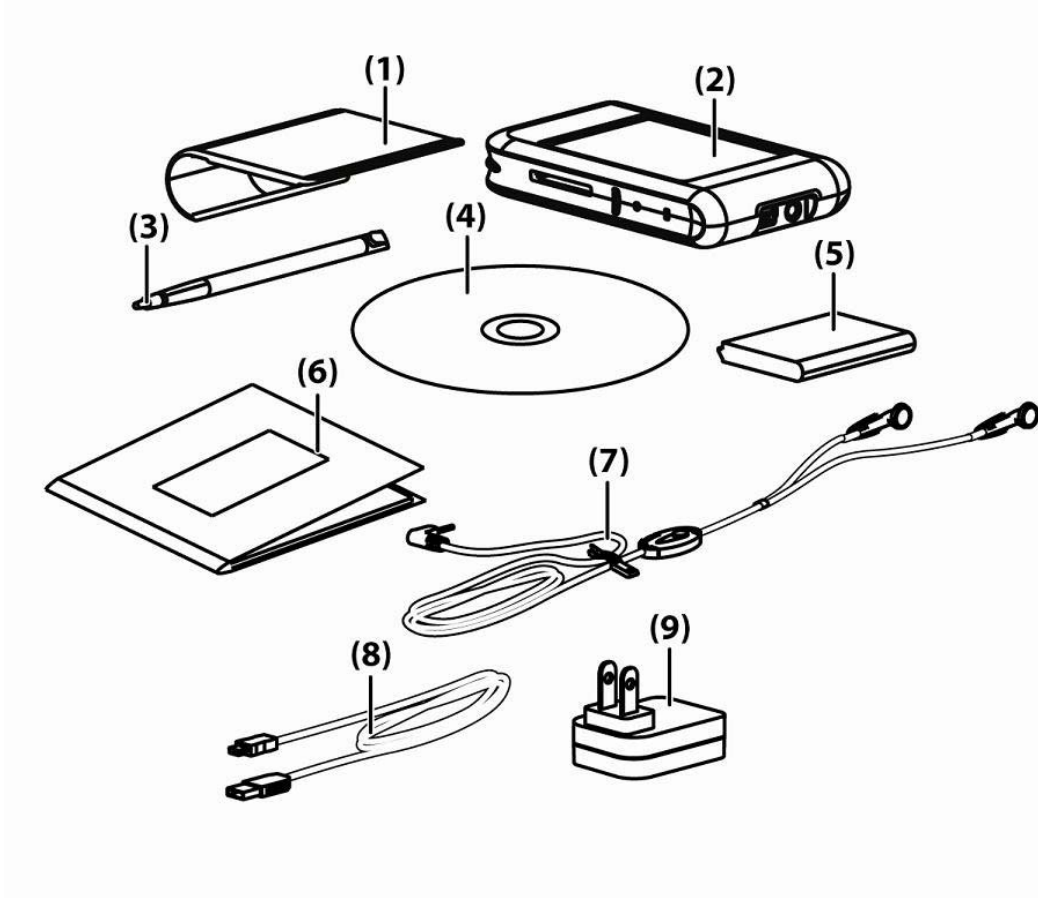


This illustration depicts the items that come in the box with your HP iPAQ.

.

**Box Contents**

**(1)** Removable clip cover

**(2)** HP iPAQ

**(3)** Stylus

**(4)** *Getting Started* CD with special software

2 HP iPAQ Product Information Guide ENWW


**Box Contents**

**(5)** 1,200 mAh Li-Ion removable/rechargeable battery

**(6)** HP iPAQ documentation

**(7)** Wired stereo headset[1,2]

**(8)** Mini-USB synchronization cable

**(9)** AC adapter with interchangeable plug[3]

## List of actions that can be done by a PDA:

1- Synchronization between PDA and up to two computers or one server so that the latest information is in all locations.

2-Entering Text:

- Using Block Recognizer

- Using the On-screen Keyboard

 -Using Letter Recognizer

-Using Transcriber


3- Playing music and watch videos

4- Viewing and managing digital photos

5-Windows Media Player 10 Mobile

6-Mobile Office

● Calendar

● Contacts

● Tasks

● Messaging

● Internet Explorer Mobile

● Word Mobile

● Excel Mobile

● PowerPoint Mobile

7-WLAN:

● Accessing the Internet

● Sending and receiving e-mail

● Accessing corporate network information

8-Bluetooth

● Transferring information, such as files, appointments, tasks, and contact

cards, between devices that have Bluetooth capabilities.

● Printing data to a Bluetooth-designated printer.

● Once connected to another device or computer using Bluetooth, you can locate and use any of the services available on that device.

## RTA software adjustment hints:

### 1-Features

44Khz sampling allowing signals up to 22Khz to be measured.

Dual Channel FFT display (PC version only).

Definable FFT size and sample frequency  (Pocket PC only).

Single channel spectrograph

Standard ANSI/IEC A and  C weighting curves.

Automatic noise cancellation.

Automatic peak note / frequency and octave display.

Narrow band Linear and Logarithmic scalable displays.

Octave, 1/3 octave and 1/6 octave displays.

SPL (Sound Pressure Level) display.

250x zoom for accurate analysis of narrow band data.

Internal Signal Generator

Touch screen plotting of nearest point with frequency and decibel readout.

Up to 64x averaging and smoothing to help stabilize the display.

Peak trace facility for better reading of fluctuating frequencies.

Selectable signal decay speeds.

Selectable signal gain control.

Pause facility freezes the live trace to aid analysis of data,

### 2-Changing FFT Settings (Pocket PC only)

Since the Pocket PC is unable to process data as fast as your desktop PC, you can change various FFT settings in order to give a faster response to our input signal. The thing to remember is that the more data we process the more accurate the results but the slower the display. If you only need to analyze signals up to 4Khz for example you can change the sample frequency to 8Khz which cuts down on the amount of data

sampled from our input source. If we only need a rough estimation of frequency then we can start with a small buffer size which again speeds up display response.
 Pressing the FFT Parameters button on your Pocket PC allows you to input new values for Sample Rate and FFT buffer size (See figure 2). If you change either of these settings you will notice that the resolution and time constant values change accordingly.
Specifying a low sample frequency and a small buffer size will provide the fastest update but at the expense of accuracy.

**3-Input Gain**

This option allows fairly course calibration of the input signal.  If the input signal is too low to read then you may wish to increase the level by 3db which is equivalent to doubling the input sound level.
In Spectrograph mode you may want to decrease the gain in order to prevent unwanted background noise from cluttering the display.

You can also use this option in conjunction with the 'Noise Weighing' curve in order to totally eliminate background noise.

**4-Spectrograph Display**
A Spectrograph is a 3D representation of frequency/amplitude over time often used for analyzing speech. Each row of the spectrograph represents the results of an FFT on a block of data read from the microphone, the lowest row being the most recent. The colors represent the amplitude of the frequency at a given point in time. Colors range from BLUE, through CYAN, GREEN and YELLOW to RED being the color representing the loudest amplitude possible.
You can halt the display at any time using the PAUSE button. It is also possible to use the cursor keys (touch screen on Pocket PC) to zoom into the spectrograph in order to focus on a frequency range.

**5-Averaging**

This function is used to help make the display more stable and easier to read. As a general rule, the more difficult the measurement conditions, the more averaging is required. Note however that increasing the number of averages also causes real-time displays to respond more slowly. If this is a problem then it may be better to increase the Decay time rather than use averaging at all.

**6-Decay Time**

Decay is a setting which refers to how quickly a frequency dies. A large decay time is often useful for measuring a highly fluctuating signal. If the input source contains small bursts of energy then setting a higher 'Decay' time may be more favorable than setting a higher 'Averaging' value. Averaging would have the side effect of diluting a signal that was present in short bursts whereas setting a high Decay time would highlight the peaks.

**7-Trace**

All display modes accept the Spectrograph display a trace when this option is enabled. The trace shows the maximum amplitude over the frequency spectrum for a given period. This can be very handy if the input source has a rapidly fluctuating signal.

**8-Pause**

The Pause feature temporarily freezes the display allowing close inspection of captured data. This is extremely useful when you have a highly fluctuating signal or when you need to take several readings across the frequency spectrum. When in PAUSE mode you can utilize PocketRTA's zoom feature and take readings by clicking the left mouse button on various locations on the graph.
 Pressing the PAUSE key a second time resumes data capture.


**9-Exiting the Program**

To exit PocketRTA on the Pocket PC press the RECORD button (left hand shoulder button on the IPAQ) or the START button (Center of the direction pad).

**Abbreviations of data collection sheet:**

Ab=Abortion

BG= Blood Group

BMI=Body Mass Index

CC= Chief Complaint

D=Dead

Dil=Dilation

Eff=Effacement

EFW=Estimated Fetal Weight

FHR=Fetal Heart rate

FM= Fetal Movement

G= Gravida

GA= Gestational Age

GYN HIX= Gynecologic history

Hb=Hemoglobin

HEENT= head-eyes-ears-nose-throat

IMP=Impression

Li=living children

LMP=Last Menstrual Period

P=Para

P=Pulse Rate

PE= Physical Examination

PI= Present Illness

Plt=Platelets

Repeat C/S= Repeat Cesarean Section

RR= Respiratory Rate

T= Temperature

UH=Uterine Height

US= Ultrasound

VB= Vaginal Bleeding

WB= Water Bag

WBC=White Blood Cells

**Sample History:**

Patients name:

Date:

## General:

| Age: | LMP | GA by LMP: | G☐ P☐ Li☐ D☐ ab ☐ | Repeat C/S |
|------|-----|------------|--------------------|------------|
| GA by US: | | | | |

## CC:
## PI:

| WB | VB | Head ache | Blurred vision | Epigastric pain: |
|----|----|-----------|----------------|------------------|
| FM | | | | |

## GYN hX

| menarch | menses | Infertility hx | contraception | other |
|---------|--------|----------------|---------------|-------|

## PMH:

| Bleeding tendency | Allergy | Medications | Surgical history | Last meal |
|-------------------|---------|-------------|------------------|-----------|
| Diabetes | HTN | Heart dis | Res dis | Kidney dis |
| Convulsions | Other | | | |

## Previous pregnancies:

## PE:

| T | P | BP | RR | BMI |
|---|---|----|----|----|
| HEENT | Lymph nodes | Heart | Respiration | Abdomen |
| Extremities | Other | | | |
| dil | eff | station | WB | position |
| EFW | Pelvic size | FHR | UH | |
| Hb | plt | BG &Rh | proteinurea | WBC |

## IMP:

## Plan: